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GRAY HERBARIUM



~~DEPOSITED AT THE  
HARVARD FOREST  
1941~~









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\*January issue, at commencement of volume.

Observations on Some Hawaiian Crop Blights...  
 .....Dr. N. A. Cobb  
 Music.....Kamehameha Glee Club  
 The Camphor Industry.....Mr. L. G. Blackman  
 A cordian invitation is extended to all who are interested.  
 F. G. KRAUSS,  
 Secretary and Treasurer.

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*TITLE PAGE AND INDEX.*

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A Title Page, Index and Table of Contents to Volume III  
 is in preparation and will accompany the February number.

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BY AUTHORITY.

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APPOINTMENT.

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Notice is hereby given that the Governor has, on the 4th instant, ap-  
 pointed Leonard G. Kellogg, Esquire, a Commissioner of Agriculture and  
 Forestry, for the term of five years.

A. L. C. ATKINSON,  
 Secretary of Hawaii.  
 Executive Building, Honolulu, January 8, 1907.

~ PINEAPPLE NUMBER ~

VOL. IV

MAY, 1907

No. 5

Price, 10c. Per Copy ; Per Annum, \$1.00; Foreign, \$1.25.

THE  
**Hawaiian Forester**  
AND  
**Agriculturist**

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### OFFICERS AND STAFF OF THE BOARD OF COMMISSIONERS OF AGRICULTURE AND FORESTRY.

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Miss Melika Peterson.  
 Miss Ella K. Dayton.

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### NOTICE FROM THE DIVISION OF ENTOMOLOGY.

The Entomological Division of this Board wishes to inform Hawaiian readers of this magazine that it is always ready and anxious to receive, study and report upon any insects that they may find and submit. When feasible either colonies of beneficial insects will be sent, or simple, inexpensive remedies will be prescribed. No charge.

# THE HAWAIIAN FORESTER AGRICULTURIST

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VOL. IV.

MAY, 1907

No. 5

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The Forester takes great pleasure in presenting this month an able paper by Dr. N. A. Cobb upon the present status of the Hawaiian pineapple industry with regard to threatened fungoid and insect pests. The wide experience of the writer, not only with regard to the special industry which his article touches, but also in general plant pathology and crop technology, entitles his conclusions to great attention and renders them authoritative. It is to be sincerely hoped that the rapidly growing pineapple industry of Hawaii will long continue its prosperous course and will successfully solve as they arise, those problems which must be expected from time to time to threaten its well being. In this, as in all tropical agricultural enterprises, success can only be achieved by constant vigilance and by the prompt application of scientific remedies. To this end we would urgently direct all pineapple growers in the Territory to a careful consideration of Dr. Cobb's paper.

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## *MEETING OF THE BOARD OF AGRICULTURE AND FORESTRY.*

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At the meeting of the Board of Agriculture and Forestry, held on April 3 last, the following Commissioners were present: Messrs. W. M. Giffard, C. S. Holloway, secretary, A. W. Carter and Gerrit P. Wilder. In the absence of Mr. Thurston, Mr. W. M. Giffard presided.

Messrs. R. S. Hosmer, Superintendent of Forestry; Jared G. Smith, Special Agent in Charge of the Federal Experiment Station; Alexander Craw, Superintendent of Entomology; Jacob Kotinsky, Assistant Entomologist, and Dr. J. C. Fitzgerald, Assistant Veterinarian, were in attendance.

At the close of the introductory business, Mr. Giffard, in expressing regret at the resignation of Mr. Thurston from the presidency of the Board, suggested the desirability of electing a successor. In the discussion which ensued, Messrs. Carter and Wilder advised deferring action in this matter until the two recently-appointed members of the Board, Messrs. Paul R. Isenberg and L. G. Kellogg, who were both absent from Honolulu, could be present. This course was finally adopted. Mr. Carter, in

speaking of the work of the former president of the Board, said substantially as follows: "I wish to record my appreciation of Mr. Thurston's work in connection with the Board of Agriculture both as a member and as its president. It was greatly through his action that its organization was perfected, and the bill which created it was drafted with his coöperation. Through his energy and the quality of his work, the duties of the other members of the Board have been greatly lightened, and it is only fitting that at the close of his tenure of office suitable recognition of this should be had. I therefore move that the secretary be instructed to write to Mr. Thurston a letter of appreciation of his services."

The motion was unanimously carried.

#### VARIOUS REPORTS.

Mr. Hosmer reported the resignation of Byron O. Clark as fire warden at Wahiawa, on account of his change of residence and recommended A. M. Nowell as his successor. The recommendation was adopted.

The resignation of Thomas S. Kay as fire warden of North Kohala was also reported. Mr. Kay recommended George C. Watt, manager of Kohala Sugar Co., as his successor. Mr. Hosmer endorsed the nomination and the meeting appointed Mr. Watt.

Mr. Hosmer submitted a report from Charles L. Judd, of the Yale forestry school, on his work at Lihue last summer, and also a thesis by the same author. The report was very creditable, Mr. Hosmer said, and he proposed to prepare a bulletin of some of its contents.

Mr. Holloway now read a letter from George C. Munro regarding his investigations of forage plants on the Island of Molokai. Mr. Munro offered to furnish a special article on the subject for the Hawaiian Forester and Agriculturist, or for a departmental bulletin. His recent visit to New Zealand, his native country, was mentioned as having increased his knowledge upon forage plants.

Mr. Smith, in the course of a general discussion on the offer, said he had seen the article and from a cursory perusal thought it a useful paper.

It was voted to refer Mr. Munro to the editor of the Agriculturist.

Dr. Fitzgerald orally reported the slaughter of ten horses, previously branded for glanders, at the Moiliili rice plantation; and also another outbreak of glanders at another place in the same locality. Dr. Nörsgaard, the head veterinarian, had gone to Maui at the request of Alexander & Baldwin. Dr. Fitzgerald also told of the work of the division relative to mangy dogs.

Mr. Smith spoke of the increase in the Federal appropriation for State and Territorial agricultural colleges to \$30,000 a year,



under a plan of increasing it until it reaches \$50,000 as the annual subsidy for each of such institutions. He further stated that the station entomologist, Mr. Van Dine, would leave for Washington this week to confer with the department officials on the honey standard. They expected him to bring back some Cyprian and Carniolan queen bees. It was hoped he might attend the National Anti-Mosquito Association meeting in New York.

Mr. Smith referred to Dr. Nørgaard's investigations in search of the sheep pest (the screw worm) and the cattle pest (the horn fly), but Mr. Giffard, as chairman of the entomology committee, will report fully on this matter later. It may be mentioned, however, that a parasite to destroy the horn fly, imported by Prof. Koebele in 1898, seems to be doing its work well.

The Federal station was continuing rubber experiments. Those in tobacco culture were exhausted, but Mr. Smith had some bales of merchantable leaf tobacco on hand besides samples sent to New York.

Mr. Carter stated that about 700 fruit trees had been planted on the Island of Hawaii, and Mr. Higgins had been sent from the Federal station to superintendent the cultivation. The list comprised, among other trees, apples, peaches, pears, apricots and plums.

Mr. Alexander Craw, Superintendent of Entomology, reported on the examination of mail matter and freight for the detection of insect pests.

With the passing of some minor expense bills the routine business was finished and the meeting adjourned.

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## *BOARD OF AGRICULTURE AND FORESTRY.*

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### DIVISION OF FORESTRY.

#### ROUTINE REPORTS.

At the meeting of the Board held on April 3, 1907, the following routine reports of the Division of Forestry were read, accepted and ordered placed on file:

November 28, 1906.

Board of Commissioners of  
Agriculture and Forestry,  
Honolulu.

Gentlemen: I beg to submit the following report covering the routine work of the Division of Forestry from October 31 to date:

During this period I have been in the office in Honolulu, engaged with the preparation of reports and other details in con-

nection with the creation of proposed forest reserves on Oahu, Hawaii and Kauai, with correspondence in regard to the library, with the gathering of material preliminary to the preparation of the annual report of the Division of Forestry for 1906, and with the regular routine work of the division.

On November 2, Arbor Day, I spoke to the pupils of the Honolulu High School on "Forestry in the United States," and on November 21 I appeared before the Hawaiian Sugar Planters' Association to read a report supplementing that of the association's Committee on Forestry regarding the work of this Division, and the progress of forestry in the Territory during the past year.

On November 12 the final papers were signed in the agreement whereby Messrs. Alexander & Baldwin turn over to the management of the Board of Agriculture and Forestry the area of privately owned land within the Koolau forest reserve on Maui. This, with the government land in the reserve, under lease to Alexander & Baldwin, approximates 27,000 acres. The consummation of this transfer I believe to be one of the most important steps that has yet been taken in the forest movement in Hawaii, in that it marks the real beginning of a closer coöperation of forest owners with the Government in the systematic management of their forest properties.

During the past month the annual report of the Board for 1905 has been widely distributed throughout the Territory. Reports have also been sent to a carefully selected list of foreign exchanges.

On November 14 there was issued Press Bulletin No. 4 of the Division of Forestry, entitled "Instructions for Propagating and Planting Forest Trees," by David Haughs; 4 pp., 1000 copies.

Arbor Day, November 2, was generally observed in the schools throughout the Territory. Mr. Haughs' report shows that a total of 2580 plants were furnished free for this purpose from the Government Nursery, as against 3554 for 1905. As was the case last year, the freight charges were paid by the Department of Public Instruction.

A number of important accessions in the way of botanical and entomological books have recently been received by the board library. A list of the new books will be given in an early report.

The library room of the Board has been used during the month by other organizations as follows: Hawaiian Entomological Society, November 1; Poultry Association, November 13 and 21; Palolo Improvement Club, November 23.

Very respectfully,

RALPH S. HOSMER,  
Superintendent of Forestry.

December 6, 1906.

Board of Commissioners of  
Agriculture and Forestry,  
Honolulu.

Gentlemen: I beg to submit the following report covering the routine work of the Division of Forestry from November 28 to date:

During this period I have been in the office in Honolulu engaged in the preparation of material for the next annual report of the division and with routine work; excepting that on Tuesday last I visited the land of Honouliuli, on this island, in company with Messrs. H. M. von Holt and O. L. Sorenson of the Survey Department, to determine the location of a portion of the boundary of the proposed forest reserve on that land. This project I shall report on to the board in the near future.

On Wednesday last Mr. Haughs visited the land of Waipio, District of Ewa, on this island, to draw up a planting plan to be followed by the Ii Estate in planting a portion of that land.

The library room of the Board has been used once during the week, for a meeting of the Honolulu Improvement Advisory Board, which was held on Friday, November 30.

Very respectfully,

RALPH S. HOSMER,  
Superintendent of Forestry.

April 3, 1907.

Board of Commissioners of  
Agriculture and Forestry,  
Honolulu.

Gentlemen: I have the honor to submit the following report covering the routine work of the Division of Forestry from December 6, 1906, to date:

#### ANNUAL REPORT.

During the greater part of this period the staff of the Division of Forestry has been occupied with routine work of various kinds. During the month of December, both Mr. Haughs and I were busy with the compilation and preparation of the annual report of the Division of Forestry. Although the first installment of copy was turned over to the printer early in January, during the whole of that month much time was spent on the report, both in



reading proof and in attending to details in connection with its publication. And in February also, when the complete report was actually in press, not a little of my own time was spent in seeing the minor details contributing to its correctness were attended to.

The report was finally issued on February 28, when about 200 copies were received from the printer and distributed to the members of the Legislature, Territorial officials and persons in one way or another connected with the Board. The full edition of the main report consisted of 2500 copies. There have also been printed separates, containing the reports of the several divisions, five hundred each. The main report has been widely distributed throughout the Territory and to addresses on the foreign mailing list of the Board.

#### ROUTINE WORK.

Some of the most important routine matters connected with the Board have been the preparation of estimates for the coming fiscal period and other financial statements having to do with the re-segregation of the appropriation for the present period. During the last four months, while I have been in Honolulu, I have been able to take care of much routine detail in connection with the library and other matters concerning the Board and the Division of Forestry. Much of this work leaves little to show for the time put into it, but were it not done the effect would be very apparent.

#### REPORT OF THE FOREST NURSERYMAN.

Mr. Haughs' report tells of his activities since the first of December. I may repeat that during this time he has prepared five planting plans for as many individuals or corporations. This work has necessitated one trip to the Island of Hawaii, one to the Island of Maui, and two to points out of Honolulu on this island. The collection of seed from forest trees in the vicinity of Honolulu has gone on as opportunity offered and a number of shipments of foreign seed have been received from different correspondents of the division. A considerable number of packages of Hawaiian seed have been sent out in exchange to botanic gardens and to persons on our Exchange List. This list is constantly being enlarged.

#### CONGRESSIONAL SEED.

During the past two months the 1906 quota of Congressional vegetable and flower seed forwarded to this office by the Delegate to Congress, Hon. J. K. Kalaniana'ole, has been distributed to

the schools maintaining school gardens and to persons applying under an offer published in the various newspapers.

#### LIRRARY.

The Library of the Board has received a number of important accessions through purchase since my last report, in the way of forestry, botanical and entomological books. The serial publications regularly received have also been increased since the first of the year by the addition of a number of magazines not heretofore taken. As has been said many times before, both the books and the periodicals are open to the public for reference, daily, during office hours.

I am glad to report that since the first of the year the number of persons per month who consult the library has been larger than in the past.

During January the Board building was painted, as was also the exhibit room containing the woods and fruits. Pursuant to action taken by the Board at an executive meeting held on January 8, the cottage in the Nursery grounds is now being put in shape for occupancy by the Forest Nurseryman.

#### LEGISLATION.

Since the beginning of the session of the present Legislature several acts have been passed that more or less directly affect this Board. Among these may be mentioned Act 4, to amend Chapter 28 of the Revised Laws so that forest land belonging to the Government may be set apart as forest reserves whether under lease or not. This is a law for which the Board has been working for some time. The Emergency Appropriation Bill contained an item of \$1500 for the use of this Board during the remainder of the present fiscal period. The other bills which less directly interest the Board are those providing for the remission of taxes on certain of the diversified industries and that creating an agricultural college.

#### FOREST FIRE SERVICE.

On February 9 a special warning notice for a period of twelve months was issued for the Tantalus section, and on March 19 a similar notice for a six months' period was issued for the upper part of the Waialua District, back of Wahiawa. I am glad to say that no forest fires have been reported this winter.

#### MEETINGS.

The use of the library room for evening meetings continues to

give satisfactory results. Since December the following organizations have made use of it:

Hawaiian Entomological Society, December 6, 1906; February 7, 1907.

Hawaiian Poultry Association, December 11, 1906; January 8, February 12 and March 12, 1907.

Honolulu Improvement Advisory Board, December 28, 1906; February 18 and March 15, 1907.

Very respectfully,

RALPH S. HOSMER,  
Superintendent of Forestry.

---

*REPORT OF FOREST NURSERYMAN.*

---

April 3, 1907.

R. S. Hosmer, Esq.,  
Superintendent of Forestry,  
Honolulu.

Dear Sir: The following report gives the principal work done by the men employed by the Division of Forestry from December 4, 1906, to April 3, 1907:

CO-OPERATIVE PLANTING WORK.

During the period mentioned the writer has made one trip to Maui, one to Hawaii and two to places on Oahu outside of the District of Honolulu. Six places have been visited in the District of Honolulu at the request of parties asking for advice on different subjects connected with the growing and care of plants.

Reports and recommendations on the following places visited have been made and the applicants given a copy of each. The originals have been placed on file in this office.

December 12 and 13: Report with recommendations on the grounds and certain lands belonging to the Lahainaluna School, Maui.

February 8: Examination and report, with recommendations, on two tracts of land in the District of Puna, Hawaii, belonging to the Puna Sugar Company and known as "Kamaili tract" and "Keahealaka tract."

March 1: Report, with recommendations, on the reforestation of certain lands belonging to the Boys' Industrial School, Waialeale, Oahu.

March 2: Report, with recommendations, on the reforestation



of part of what is known as the "Kawailoa tract," belonging to the Waialua plantation.

On March 26, at the request of Father Adelbert Rielander, a visit was made to the Catholic Mission lands in Kalihi Valley. A report on the lands is at present being prepared.

An application for advice and assistance on tree planting, etc., has been received from A. M. Nowell, manager of the Wahiawa Water Company. A visit to Wahiawa will be made in the near future.

#### THE COLLECTION AND DISTRIBUTION OF SEEDS.

The collection of seed has been continued. Over fifty full sets are being prepared for exchange purposes. These will be sent to botanic gardens, experiment stations and other institutions on our exchange list.

The consignment of vegetable and flower seeds received from the Hon. J. K. Kalanianaʻole are being gradually disposed of. Many applications are coming in from all over the Islands for same.

#### NURSERY AND SEED CATALOGUES.

A large assortment of nursery and seed catalogues is now on file in this office for the use of the general public. A communication was sent to the Gardener's Chronicle, London, stating that we would like to receive catalogues of the different nursery and seed firms in Great Britain. The communication was published in the above paper. Since then catalogues have been coming in from all over Europe. We have also on file catalogues of the leading firms in the United States, Australia, Japan and Ceylon.

#### THE NURSERY.

The work in the Nursery has been principally routine work. Preparations are being made to curb the principal walks. The narrow cross walks are being filled up and will be grassed over. Coral rock is being carted and the walks will be made similar to the one at the east side of the office.

#### NUUANU STATION.

Since the first of March only one man has been employed at the station. Keeping the trees clear of vines is the principal work.

Very truly yours,

DAVID HAUGHS,

Forest Nurseryman.

# BOARD OF AGRICULTURE AND FORESTRY.

## Division of Entomology..

### PRINCIPAL CITRUS INSECTS IN HAWAII.

By JACOB KOTINSKY.

(Continued from last "Forester.")

#### NOXIOUS INSECTS.

Primarily the citrus insects may be grouped as either injurious or beneficial. To those not familiar with correlating the habits of insects with their appearance there are no ready external signs by means of which to differentiate the useful insects from the injurious ones. It becomes necessary therefore to familiarize ourselves with the appearance and habits of each species separately in order to learn to distinguish friend from foe. As the injurious insects require our first attention we will give them first consideration.

#### PURPLE SCALE (*Lepidosaphes pinnæformis*, Bouché).

No insect affecting citrus plants on these islands is more destructive to these plants. Checked but little by predaceous or parasitic enemies, the scale, once it secures lodgment upon a tree, multiplies rapidly and continues sapping its vitality until the tree is killed, unless some artificial remedy is applied.

*Larva.* The group of scale insects to which the purple scale belongs are rather peculiar in that through most of their lives their resemblance to an ordinary insect is very slight or not at all. When newly hatched the larvae bear six legs, a pair of antennae in front, and two rather long waxy filaments projecting behind, a pair of simple eyes and a short sucking beak. At this stage no known difference between the sexes exists, and it is the only period in the life of the female when she is not fixed to the host. In this condition the insect remains but two or three days in our climate, after which it attaches itself to the host, casts its skin and begins to build the scale over itself—its permanent home.

*The female scale.*—This consists mainly of waxy substance which as it grows older becomes hardened,—leathery or horny. In shape the scale is linear or mussel-shell-like, narrow in front where it consists of the two skins cast by the insect in course of growth and wider posteriorly. The first molt lies in front and overlaps the second, which is larger and already covered with considerable waxy matter. The scale proper then extends to the rear so that the entire scale is about 2.5 mm. (0.1 in.) long.

It seldom runs in a straight line, however, since in course of construction, if an obstacle is met, the line is deviated and the scale curves in one or more directions. Most often the scales occur in large numbers, and then they are piled in one on top of the other, sometimes three and more tiers deep, and then of course the curvature of the normally linear scale is almost universal. The surface of the scale is more or less marked by transverse lines, somewhat shiny, and in color brown of various shades, rarely purplish. The name "purple scale" comes from Florida, where it seems to be more purple than here, and because of the color of the male scales.

*The male scale* is about half as long as, narrower and more linear than that of the female. It has but one cast skin in front, and is rather purplish in color. In structure it is similar to that of the female scale.

*Female.*—With the first molt the insect is divested of its legs and antennae, leaving but a hair-like proboscis for absorbing food, and the body for carrying on the life processes. Virtually this body is but a sack which later in life becomes filled with eggs, and these laid, the insect dies and dries up where it first settled for life. This sex never develops wings.

Shortly after the second molt the female is impregnated and soon thereafter egg laying commences. The eggs are laid beneath the scale in rows which, as they are gradually pushed backward, lose their regularity. H. G. Hubbard, who studied orange insects in Florida, tells us that one female lays on an average about 45 eggs.

*Male.*—After casting the first and only skin the insect passes a pupa stage and then emerges as a perfect insect with two wings, six legs and four eyes, two of which replace the mouth for which it has no use. This stage of perfection is attained usually about the time a female, born about the same time, has cast the second skin.

The number of broods produced in course of a year has not been definitely ascertained in these islands, but it can be safely assumed to be somewhere between three and four. It will be readily observed that one pair, unhindered by natural checks, will produce within one year of four broods, 594,436 individuals. It is not surprising that, unassisted, trees are frequently reduced to helplessness and death in course of three or four years.

It is also evident that to start a colony a female must be transported during the short period of her active life, her life as a larva. The male, even tho winged, is a feeble flyer, hence is also largely dependent upon the transportation agencies utilized by the female. This is accomplished by the larva itself in case of contiguous trees. To greater distances the larvae are carried either by wind, birds, or other insects. As a bird or insect rests upon an infested tree while the larvae are crawling about in



search of a place for attachment, these crawl upon the bird's legs and the insect body, and by them carried great distances. Sometime, and when they stop to rest again, the larvae or some of them crawl off and if the food plant is favorable increase there and thus a new colony is started. Man, however, is the most significant transporting agent, especially when great distances are considered. Wherever he went he carried his domesticated plants with him and upon them he also unwittingly carried the agents of destruction of those plants. So regular and certain was he to carry the purple scale upon citrus trees from country to country that now the origin of the insect is unknown because its distribution is universal wherever citrus plants are grown.

*Enemies.*—There are several enemies of the purple scale in the Territory, but their combined effort seems at times to avail us little in checking the pest. As descriptions of these will follow later we will here only name them. Two ladybirds, the orange and steel-blue, are always to be found, tho but sparingly, on trees infested with this scale. They doubtless devour a good many scales, but they also feed upon other scale insects on these trees, and being few in number, their work is not telling. The same may be said of the internal parasites that manifest their work upon male and immature female scales by the round holes of their exit through the scale after devouring the insect beneath it. These parasites also attack other scale insects, hence, not being specific enemies of the purple scale their work is seldom effective. This spring most of the trees examined, especially the limbs and trunks look remarkably free of scale. Possibly the rains of the past season have depleted their numbers and possibly also the parasite have, temporarily at least, gained the upper hand.

*Remedies.*—A simple, inexpensive and effective remedy against this pest is the application of a soap (common or whale oil) solution (soap, 1 lb. in water, 4 galls.) applied with an efficient spray pump, while the solution is hot, three or four times in succession at intervals of two weeks. While it is doubtful whether this wash affects the full grown scale owing to its water-proof armor (this group is known as "armored scales") it is sure to kill every young larva it covers, and repeated, should kill all young that may hatch subsequently. That the application must be thoro goes without saying. Every larva possible must be killed or the work is correspondingly nullified in proportion to the number of larvae left alive.

(To be continued.)

REPORTS OF HORTICULTURAL QUARANTINE INSPECTION WORK.

Honolulu, Hawaii, April 3, 1907.

To the Honorable Board of  
Agriculture and Forestry,  
Honolulu, T. H.

Gentlemen: During the months of January, February and March we inspected thirty-five steam and sailing vessels from the mainland, seventeen from the Orient, ten from Australia and eight from other points, in all seventy-one vessels that arrived from outside the Territory, on which we found twenty-four thousand nine hundred sixty-five (24,965) packages of fruits and vegetables, twenty (20) bales, boxes and cases of plants and trees, and one hundred and fifty-nine (159) packages of seeds and plants by mail. Of the above, twenty-two (22) cases of fruit and fifty-seven (57) packages of plants and trees were infested with injurious insects and were therefore destroyed. Evidently greater care is now being exercised in the selection of fruit and plants sent to this Territory. All imports found slightly infested with insects already established here were fumigated with hydrocyanic acid gas or carbon bisulphide before delivery.

In accordance with your instructions, we have endeavored to locate all the young Indian mangoes which have been propagated from the trees that were imported and planted a few years ago, before the present inspection law was in force. The most of these trees have been located and treated and a record of them taken, so that they may be reinspected again later on.

Because of the widespread existence of "Asparagus rust" on the mainland, we now make a practice of dipping in "Bordeaux mixture" all such roots received.

A shipment of seven hundred and twenty cases of onions arrived from Australia on the S. S. Sonoma on February 20 that had been damaged by salt water. In some of the decayed bulbs we observed numbers of very small white maggots and pupae and in breeding out a few they proved to be, as I suspected, "Pomace flies" (*Drosophila*), usually found around decaying fruit, or other vegetable matter, and which are classed as scavengers.

From dead specimens of the "melon fly" (*Dacus cucurbitae*) received by this Division from the government entomologists of India, we learn of the existence of several parasites that prevent its seldom or ever becoming a pest there. An effort should be made to introduce these parasites here by way of Hongkong. This would be a difficult experiment owing to the great distance, but the undoubted benefit to the melon industry of this Territory, in case these parasites were successfully introduced and established,

would justify the expenditure of considerable money in the attempt to control this pest.

On January 22 the S. S. Mariposa was compelled to call here to secure a supply of fuel oil to finish her voyage to San Francisco from Tahiti. She had on board a quantity of young cocoanuts, also some "alligator pears," which we would not allow to be landed here, the former being subject to the attack of a fly (similar to the melon fly) in some of the South Sea Islands.

On January 11 the four-masted American iron ship E. M. Phelps arrived from Manila. We inspected the ballast on board and found it to consist of dark sand and small shells taken from the beach of Cavite below Manila. We also examined it when it was being discharged, but failed to find any trace of vegetable matter. It was used for cement work in town. Another American iron ship, the Astral, arrived from Japan on March 4 with clean sand and gravel and was allowed to discharge on the wharf. The inspection of ballast of this nature coming from foreign ports is to prevent the introduction of soil which might contain the larvae or grubs of obnoxious insects.

Fifty grafted peach trees slightly infested with the destructive "West Indian Peach Scale" (*Alaocaspis pentagona*) arrived from Japan and were immediately burned. This is the scale that was introduced into the grounds of the Department of Agriculture at Washington, D. C., and which withstood treble strength of the best liquid insecticides which only killed a very low percentage of them. From the same country came ten small Japanese maple trees badly infested with *Parlatoria theae*, also five Japanese Camellias with *Pseudanidia duplex*. As both these pests were injurious, the plants were also destroyed.

A few orchids from the Philippine Islands were imported having a small larva working in the crowns of the plants. The plants were fumigated with hydrocyanic acid gas even to injuring the foliage, but as the larva did not seem to be affected by the fumigation each plant had to be hand picked before delivery.

Several lots of lemons imported from California were found slightly infested with "red scale" (*Chrysomphalus aurantii*), which is already here. This fruit was therefore only fumigated.

The establishment of the American-Hawaiian line of steamers between Salina Cruz and Honolulu exposes us to a new danger, i. e., the introduction of the serious orange maggot (*Trypeta ludens*). I therefore addressed a letter to the local general freight agent, C. P. Morse, calling his attention to this pest and requesting him to instruct the agents at Salina Cruz not to accept any citrus fruits as freight for any portion of this Territory, nor to allow any one to bring such fruits on any of their steamers. I also enclosed a copy of the Board's regulations and the law covering this matter.

The entomologists of this Board have recently been investigating the result of the introduction and distribution of the parasite (*Eucoila impatiens*) of the "Horn fly," which Prof. Koebele sent this Division from Arizona, and I am pleased to report that it appears to be establishing itself. This parasite has also been noticed by other entomologists, so we feel confident that it will eventually be found wherever colonies were sent during the past season, and that it will be effective in reducing the number of that annoying stock pest. This parasite will be found illustrated on page 147 of your report. This Division has commenced a systematic inspection of the neighborhoods where all of Prof. Koebele's "Horn fly" parasites were distributed, and will shortly report further as to the result of the investigation.

I beg to call your special attention to the recommendation made in my report of 1905 regarding the "Introduction of Beneficial Insects." I respectfully ask that the subject be brought before the present Legislature for action. I quote the following from the Report above referred to:

"Through the efforts of your Honorable Board, several species of internal parasites and predaceous insects for the suppression of our destructive species have been introduced, and from examination we feel hopeful that they will come up to our expectations. As Mr. Kotinsky, my assistant, has referred to this work in detail, it will not be necessary to take this matter up further than to suggest that you bring this important work before the attention of our Territorial legislators urging them to make a liberal appropriation . . . so as to enable you to further continue the search for such friendly assistants to our agriculturists. There is positively no danger from the intelligent introduction of such insects that prey upon injurious species, for their stomachs will no more digest vegetable matter than that of a lion's or tiger's will. Such insects when once introduced are constantly working without pay in the interests of our farmers, planters and, in fact, all lovers and cultivators of trees and plants, not even exacting a portion of our crop as their part. What all this means can be gleaned from the introductory remarks or statement of this report of the enormous loss by the depredations of insect pests. It is the introduced injurious species that prove to be such formidable ones, as they are usually brought into new countries without their more highly-bred, natural checks, which can generally fly away during the time occupied in the transportation of the plants. This way of fighting our insect enemies is not any longer an experimental one, but has saved millions of dollars of property, besides retaining the value of adjoining property already improved or unimproved. Not only is our farming population increased, but our merchants, tradesmen and bank-

ers also feel the effects of the improved agricultural conditions; so all our people are benefited by the expenditure of money in this work.

"We have in Prof. Koebele one of the best and most competent and successful collectors of beneficial insects in the world, so that any money appropriated for such work will be expended in the best manner, in the interest of these Islands, as his past work has fully demonstrated. As a business proposition I feel confident that our legislators will not hesitate in furnishing you with ample funds to carry out this work so successfully started."

What has been accomplished by the sugar planters in controlling the cane leaf-hopper would justify your presenting a special bill for an appropriation of at least \$5000 to carry on the work of introducing beneficial insects during the next biennial period.

Respectfully yours,

ALEXANDER CRAW,  
Superintendent of Entomology and Inspector.

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*THE NEW LAWS.—Continued.*

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ACT 106.

AN ACT

TO AMEND SECTIONS 370, 371, 373 AND 375, AND TO REPEAL SECTION 372 OF THE REVISED LAWS OF HAWAII SO AS TO REORGANIZE THE BOARD OF COMMISSIONERS OF AGRICULTURE AND FORESTRY.

*Be it Enacted by the Legislature of the Territory of Hawaii:*

Section 1. Section 370 of the Revised Laws of Hawaii is hereby amended by striking out the period after the word "Senate" in line four thereof, and by inserting after said word "Senate" the following words, "one being designated as President of the Board," so that the Section as amended shall read as follows:

"Section 370. Commissioners, Appointment, Tenure. There shall be a Board of Commissioners of Agriculture and Forestry of five members, who shall be appointed by the Governor by and with the advice and consent of the Senate, one being designated as President of the Board. One of said Commissioners



shall be appointed to hold office for one year, one for two years, one for three years, one for four years, and one for five years from January 1, 1904. Upon the expiration of the respective terms of the said Commissioners, their respective successors shall be respectively appointed for a term of five years. Upon a vacancy occurring in said Board, a Commissioner shall be appointed to fill such vacancy for the remainder of the unexpired term."

Section 2. Section 371 of the Revised Laws of Hawaii is hereby amended by striking out the words "President and another" in line two thereof; and also by striking out the word "officers" in line three thereof, and inserting in lieu of said word "officers," the word "Secretary," so that the Section as amended shall read as follows:

"Section 371. Board, Officers, Quorum. The Commissioners shall elect one of their members Secretary of the Board. The Board shall have power to change its Secretary from time to time. A majority of the members of said Board shall constitute a quorum thereof, with power to transact any business within the powers or jurisdiction of the Board."

Section 3. Section 372 of the Revised Laws of Hawaii is hereby repealed.

Section 4. Section 373 of the Revised Laws of Hawaii is hereby amended by striking out the first four lines thereof, together with the word "the Superintendent of Public Works" in line five thereof, and by inserting in lieu thereof the following words "the powers and duties vested prior to April 25, 1903, in the Commissioner of Agriculture and Forestry and thereafter transferred to and vested in the Superintendent of Public Works are hereby transferred to and vested in the President of the Board," so that the Section as amended shall read as follows:

"Section 373. Executive Officer of Board. The powers and duties vested prior to April 25, 1903, in the Commissioner of Agriculture and Forestry and thereafter transferred to and vested in the Superintendent of Public Works, are hereby transferred to and vested in the President of the Board, who shall be the Executive Officer of the Board, subject to the superintendence and control of the Board."

Section 5. Section 375 of the Revised Laws of Hawaii is hereby amended by striking out the period after the word "pay" in line two thereof, and inserting after said word "pay" the words "except the President, who shall receive such salary as may be appropriated by the Legislature;" also by striking out from said section the sentence "The Superintendent of Public works shall receive no pay for services performed by him under the terms of this Chapter other than the salary appropriated by the Legislature for his said office of Superintendent of Public Works," so that the Section as amended shall read as follows:

"Section 375. Board, Expenses, Pay. The members of the Board, appointed under this Chapter, shall serve without pay, except the President, who shall receive such salary as may be appropriated by the Legislature. The Board shall be entitled to pay the traveling expenses, within the Territory, of its members when actually engaged in business relating to the work of the commission, and also all cost of postage, stationery, correspondence, records, printing and other expenses necessarily or properly incidental to the business of the Board."

Section 6. This Act shall take effect from the date of its approval.

Approved this 29th day of April, A. D. 1907.

G. R. CARTER,  
Governor of the Territory of Hawaii.

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ACT 94.

AN ACT

MAKING SPECIAL APPROPRIATIONS FOR THE USE OF THE COLLEGE OF AGRICULTURE AND MECHANIC ARTS OF THE TERRITORY OF HAWAII, DURING THE TWO YEARS WHICH WILL END WITH THE 30TH DAY OF JUNE, A. D. 1909.

*Be it Enacted by the Legislature of the Territory of Hawaii:*

Section 1. The sum of Ten Thousand (\$10,000) Dollars is hereby appropriated out of any money remaining in the Treasury for and on account of the Loan Fund, for the erection of a building or buildings for the use of the College of Agriculture and Mechanic Arts and the purchase of fixtures, apparatus, and appliances for the same.

Section 2. The sum of Fifteen Thousand (\$15,000) Dollars is hereby appropriated to be paid out of all moneys in the Treasury of the Territory received from all current receipts of the general revenue for the use of said College for the biennial period ending June 30th, 1909, as follows:

Salaries and pay roll .....	\$10,000
Incidental expenses .....	5,000

Section 3. This Act shall take effect from and after the date of its approval.

Approved this 23rd day of April, A. D. 1907.

G. R. CARTER,  
Governor of the Territory of Hawaii.

*BY AUTHORITY.*

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## BOARD OF COMMISSIONERS OF AGRICULTURE AND FORESTRY.

Notice is hereby given that MR. W. M. GIFFARD has been elected PRESIDENT of the BOARD OF COMMISSIONERS OF AGRICULTURE AND FORESTRY to succeed MR. L. A. THURSTON, resigned. ,

C. S. HOLLOWAY,

Secretary and Executive Officer,

Board of Agriculture and Forestry.

Honolulu, H. T., April 9, 1907.

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Notice is hereby given that MR. A. M. NOWELL is now DISTRICT FIRE WARDEN for the whole of the District of Waialua, Island of Oahu.

C. S. HOLLOWAY,

Secretary and Executive Officer,

Board of Agriculture and Forestry.

Honolulu, T. H., April 6, 1907.

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Notice is hereby given that MR. GEORGE C. WATT has been appointed DISTRICT FORESTER in and for the District of North Kohala, and that portion of the District of Hamakua lying between the District of North Kohala and the Waimanu Valley, Island of Hawaii; and DISTRICT FIRE WARDEN in and for that portion of said District of North Kohala extending along the coast from the land of Kaauhuhu to the Hamakua District line.

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Notice is hereby given that MR. SAMUEL P. WOODS has been appointed DISTRICT FIRE WARDEN for that portion of the south part of the District of North Kohala, Island of Hawaii, extending around the coast from the north boundary to the land of Kawaihae I, to and including the land of Kaauhuhu.

C. S. HOLLOWAY,

Secretary and Executive Officer,

Board of Agriculture and Forestry.

Honolulu, T. H., April 8, 1907.

RULE AND REGULATION BY THE BOARD OF COMMISSIONERS OF  
AGRICULTURE AND FORESTRY CONCERNING THE  
IMPORTATIONS OF RICE.

*RULE III.*

The Board of Commissioners of Agriculture and Forestry hereby make the following rule and regulation:

Section I. For the purpose of preventing the introduction into the Territory of Hawaii of insects, their larvae or pupae, injurious or liable to become injurious to rice either growing or stored, all persons, companies and corporations are hereby prohibited from introducing or importing into the Territory of Hawaii or into any of its ports, any rice infested with such insects.

Section II. If any rice infested with insects, their larvae or pupae, injurious to rice either growing or stored, shall be imported or introduced into the Territory of Hawaii or into any of its ports, the same shall, in the discretion of the Board of Commissioners of Agriculture and Forestry, or its duly authorized agent, officer or inspector, be immediately destroyed or deported at the expense of the importer or introducer, and the person or persons or corporation introducing or importing the same shall be guilty of a misdemeanor and shall be liable to the penalty or penalties provided by law.

Section III. This regulation shall take effect from and after the approval thereof by the Governor.

C. S. HOLLOWAY,

Secretary and Executive Officer.

Approved:

G. R. CARTER,

Governor of Hawaii.

Honolulu, September 7th, 1906.

The publication of this regulation in the "Forester" was inadvertently overlooked.

## NEW WORK ON HAWAIIAN FRUIT.

*Fruits of the Hawaiian Islands, by Gerrit Parmile Wilder, in three volumes, Volume I, Illustrated with thirty-six Half-Tone Plates, Honolulu, 1907, Hawaiian Gazette Co., Ltd.*

The first volume of Mr. Gerrit P. Wilder's work on the fruits of our islands, has recently been published, and in its merits quite fulfils the expectation with which it was anticipated. It consists of a series of half-tone reproductions of Hawaiian fruit, each of which is accompanied by an interesting description. Botanical, historical and cultural notes are freely given and add greatly to the value of the volume to the general reader, who often is deterred from the enjoyment of books of a similar nature from a multiplicity of technical terms. Here, however, scientific nomenclature is not obtrusive and one unversed in botanical lore, can find both recreation and enjoyment.

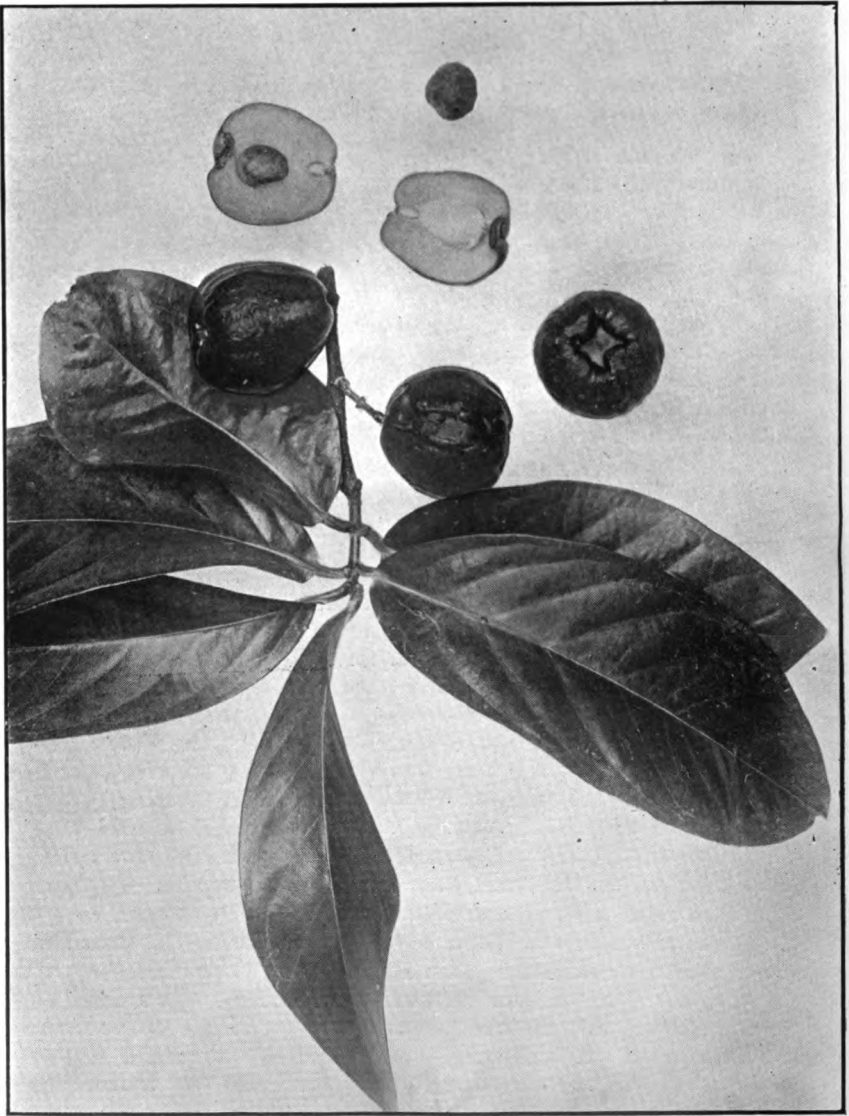
Mr. Gerrit P. Wilder has long held a reputation for the work upon which he is engaged of introducing and developing new and better varieties of fruit. In the past he has achieved great success in the grafting and budding of avocado pear and mango trees. He is also actively engaged in evolving types of such fruits as papaia and mangoes better suited to the peculiar requirements necessitated by supplying a market two thousand miles distant from the source of supply. This is a work requiring some years for a satisfactory result, but upon which encouraging headway has been made.

To many who have not investigated the subject, the wide diversity of the fruit grown in the islands as shown in the first volume of Mr. Wilder's book, is as astonishing as it is pleasing. The species illustrated and described include such well known ones as the avocado pear, the papaia, and the fig, and such rare specimens as the durian, the sapodilla and the sapota. Those who have been wont to associate the delicious Poha with everything Hawaiian, will be surprised to learn its Brazilian origin, and its association with the prosaic "Cape Gooseberry." So long a sojourn in our midst has given the Poha a familiar air and allowed it to masquerade as a member of our native flora.

The information regarding the fruit of the male and female papaia trees will be interesting to many, and also that concerning the durian, which possesses the unique distinction of conjoining the most repulsive and nauseating odor with the most fascinating and luscious flavor. This tree, a native of Java, is considered by some authorities to produce by far the most delicious fruit in the world. Its flavor is said to resemble a mixture of sherry, cream, ripe pineapple and onion, and is so highly regarded that travelers make journeys even from Europe to enjoy it.

The student will find much in Mr. Wilder's book to repay its perusal. We commend it to all who are interested in the study of our island fruits and we look forward to the publication of future volumes.





*Mountain Apple.*

One-third natural size.

—From Gerrit Parmile Wilder's book, "*Fruits of the Hawaiian Islands*," Plate viii.

## NOTES ON SOME DISEASES OF THE PINEAPPLE.

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BY N. A. COBB.

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From an examination of three pineapple areas in widely different parts of the world I should say that the probable course of events to be expected in the growth of such an agricultural industry would be as follows:

First, the introduction of fairly good seed pines on fairly good land suitable to the industry.

Second, a period of rapid growth during which the profits are satisfactory.

Third, a period of falling off in the yields, due to the accumulation of the pests of the crop.

Fourth, a period of loss, followed by the closing of many of the concerns engaged in the industry, a period of keen disappointment to many having money invested in the industry.

Fifth, a period of adjustment, during which the profits are small to nearly all concerned, until such methods of growth are reached as can be permanently followed with paying results.

I do not believe that the main features of this program can be altered. I base this belief on the fact that there is no known way of preventing the accumulation of the pests of the crop. To a large extent it is possible to repair the depletion of the soil due to the growth of the crops, and at a cost that still leaves a good margin of profit. It is known that to a certain extent the fall in yield, where pineapples follow pineapples for a series of years, is due to what is commonly termed exhaustion of the soil. It is my belief that this loss is much less serious than that due to the accumulation of disease. The diseases arrive in ways that are beyond our knowledge in some cases, and beyond our observation in nearly all cases, and hence are to a great extent beyond our control. We can delay their arrival, and we can hinder their development after they do arrive, at least in the case of those whose nature we understand, but that is all we can expect to do.

This may seem a rather gloomy picture, but I have put in the darks first for several reasons. I have seen something of

the disappointment that follows from not appreciating the facts as above presented. A broken industry and a disappointed people are not pleasant sights, and one does not soon forget the impression they create. Their greatest use is to teach others to profit by studying into the cause of the misfortune.

It seems to me that the principal cause of failure in the pineapple industry is contained in the third stage sketched above, namely, in the period of failing off in the yields due to the accumulation of the pests of the crop.

Now, while it is not possible by any known practicable means to prevent the arrival of these pests, or to prevent their accumulation, it is possible to delay their arrival, and to hinder their development to such an extent that the period of acute depression in the business, which has been a very constant feature of the history of such enterprises, can be both delayed and mitigated so that the industry does not have to suffer a readjustment following on bankruptcy and all its attendant disappointments and evils. All that is necessary to do this is to provide beforehand for these necessary evils.

The main line of action is to watch for the arrival of possible pests with a view to stopping them altogether. Nothing less should be the aim of all inspection and quarantine of imports. This part of the plan is in operation in Hawaii in the form of an inspection of imports. The effect of this beneficent law should be to at least delay the arrival of pests. It is unreasonable to expect the impossible. In spite of all precautions, we know that diseases do occasionally get past almost any inspection. After they arrive at the pineapple plantations they may be hindered in their accumulation, and the exercise of sufficient care will prevent their ever becoming the scourge they may become if they are neglected.

The following pages deal with one of the main rots of the pineapple that has already arrived at the plantations on the islands of Oahu and Kauai, and in all probability the remaining islands where the pineapple is grown. At the present time this rot is not causing such severe losses as it will undoubtedly cause in the near future, unless greater precautions are taken to prevent its accumulation. I refer to the fungus scientifically known as *Thielaviopsis ethacetica*, Went. At present this is the commonest rot of the pineapple in Hawaii. Nearly every pineapple grower will at once recognise it when I say that it is the soft rot accompanied by a sooty black color of the watery tissues in the last stages. The earlier stages are not accompanied by the black color; on the contrary, the fungus merely softens the tissues, discoloring them but little.

I have described this disease as it relates to cane in a bulletin published by the Hawaiian Sugar Planters' Association. The following is quoted from that source. After reading it the reader will see that this rot is one of equal interest to both industries.

#### THE PINEAPPLE DISEASE.

(*Thielaviopsis ethacetica*, Went.)

"The disease was first studied by Dr. F. Went, in Java. He first investigated and classified the fungus causing the disease. Since that time (1893) it has been observed in the West Indies and in Hawaii.

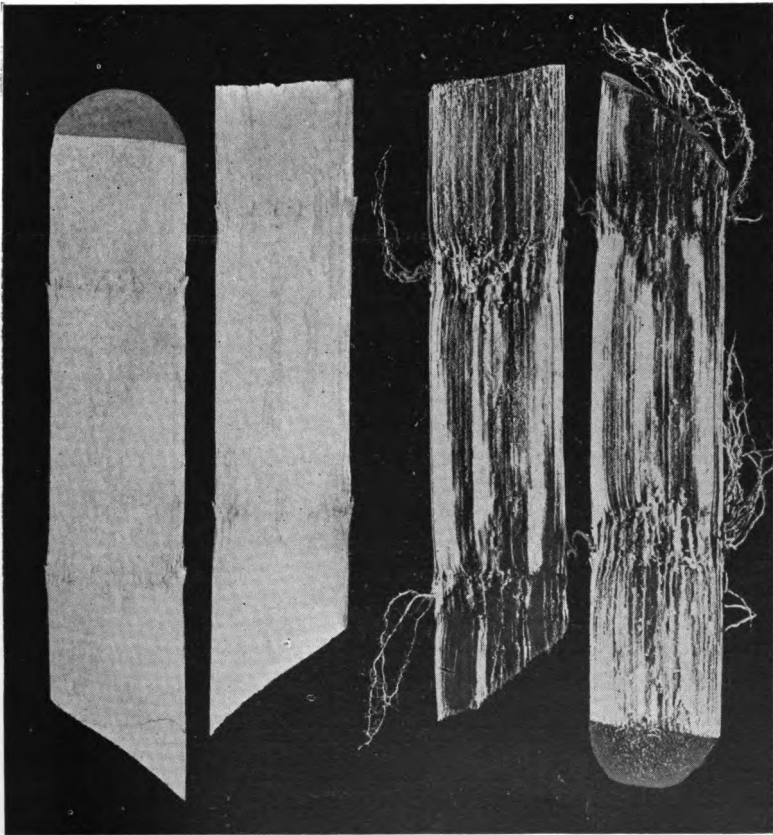


Fig. 1. Two cuttings to show more clearly the destructive action of the pineapple fungus. The right hand untreated cutting has been completely ruined in a few days although its condition when planted was like that of the sample shown at the left.

It is commonly asserted that this disease of the sugar-cane receives its common name on account of the fact that its presence in the tissues of the cane gives rise to an odor resembling that of pineapple. The specific name of the fungus, *ethaceticus*, refers to the same fact, its translation into English reading, "acetic ether," so that we may call the species the acetic-ether-producing fungus.

It is true, that, in some of its stages, and especially in some varieties of cane, the growth of the fungus gives rise to an odor reminiscent of ripe pineapple, but a delicate nostril would seldom, I think, mistake one odor for the other. More often the odor is that which we associate with fermenting fruit juice, due no doubt to a mixture of the vapors of various alcohols, acids, and ethers, prominent among which may be, and probably is, acetic ether. This odor of fermentation is the usual characteristic of most of the stages of the pineapple fungus as it occurs in cane. Only the later stages of the fungus attack are devoid of this odor, or if present, it is overpowered by others.

There is another reason why the name pineapple disease may be applied to this malady of cane, and that is that the same disease attacks the pineapple, as well as some other fruits. This fungus is, in fact, one of the serious diseases of the pineapple in some places. It is prevalent in the Hawaiian Islands on pineapples and does no small damage on some plantations.

The fact that the disease can be present in a most pronounced form without the odor of pineapple being noticeable renders the name a little unfortunate from the first point of view, but nothing can be said against the name from the second point of view, that is to say in view of the fact that the disease also attacks the pineapple. It is well to know that in fields where the disease is common one may often dig up and examine scores of cuttings without once detecting a pronounced odor of pineapple. As before stated, the variety of cane is one factor in the production of this odor. Yellow Caledonia is one of the varieties that even when suffering acutely usually gives off merely an odor of fermentation. I have found the ethereal odor most pronounced in such varieties as the Striped Singapore, and in such canes the odor is sometimes much stronger than that of the most highly scented pineapple.

#### HOW TO DETECT PINEAPPLE DISEASE.

To detect this disease in planted cuttings one has therefore to rely upon other indications than the odor of the diseased tissues. The odor is usually present in a faint degree, and is certainly quite different from that of sour cane. As a rule it is a very faintly ethereal odor that almost evades detection and is rather earthy and clean in character.



The visual characters of the disease are subject to considerable variation, but there is one character that is more or less decisive, and that is the occurrence of a "pipe" through the axis of the cane. This pipe is dark colored, in fact, is sooty black when fully developed. I know of no other cause for this peculiar appearance when it occurs in planted cane cuttings. The rind-disease will discolor the interior of cuttings, and even render their tissues more or less black. But these dark appearances are marginal rather than central, and are seldom symmetrically arranged. Nor are they, as a rule, sooty in appearance. We may assume then that any cutting that has been planted for above a week and shows a central sooty-black "pipe," is suffering from pineapple disease, especially if the odor of the more undeveloped part of the pipe is of the character described above; and if the odor is distinctly that of pineapples, or thereabouts, there can be no doubt of the identity of the disease. This makes it unnecessary in many cases to resort to the microscope for a determination.

The onset of the disease is at the end of the cutting, and it proceeds toward the middle along the axis of the cutting, usually from both ends. It appears that the looser axial portion of the cane stalk is that most suitable for the development of the fungus, no doubt on account of the presence of air. Finally, of course, all parts of the cutting except the rind are attacked. The softer varieties like Lahaina, Rose Bamboo and Striped Singapore are reduced to a mass of black fibres contained in a thin shell, for the rind resists decay much longer than the center. If the variety has a thick and tough rind the "pipe" is more pronounced and is confined more nearly to the axial region. This is true of Yellow Caledonia.

The disease is not known to have the power to enter the sound tissues of cane or other plants. As it always enters through some break or wound, it is ranked with the wound parasites. So far as cane is concerned the "wound," in most cases, is the cut surface of the cane, the disease being largely confined to attacks on cuttings after they are planted.

#### PROGRESS OF THE DISEASE.

In its progress through the cutting the fungus has to pause at each node on account of the extra density of the nodal tissues. After struggling through the node it again makes rapid progress until it reaches the next node. The entrance to a new internode is usually marked by the appearance of pink or red elongated streaks in the central tissues of the cutting, and these colors may extend in a modified degree to the marginal parts. It is during the accelera-

tion of the disease due to its entrance into a new internode that the odor reaches its maximum. In the softer varieties of cane the odor at this stage is strong and almost penetrating.

#### MICROSCOPIC TEST.

The most decisive test of all, of course, is the microscopic examination,—in fact, in some cases it is the only certain criterion. If the spores of the fungus can be obtained, the identity of the disease is at once put beyond question.



X 325

Fig. 2. Macrospores of the Pineapple Disease *Thielaviopsis ethacetica*. It is these spores which impart to the tissues attacked by Pineapple Disease the characteristic dark color. These spores do not germinate at once but require a period of rest.

The sooty black appearance of the central tissues is brought about by the formation of dark-colored spores on the ends of certain mycelial branches. These spores appear only after a certain length of time, and it is therefore desirable to be able to recognize the fungus in its mycelial stage. This is not difficult. There are a number of fungi that attack cane cuttings, but of all these the mycelium of the pineapple fungus alone has certain fairly well defined characteristics.

The microscopic test is conducted as follows: Search for tissue that appears to have been darkened by the disease, and from such tissue scrape away some of the loose dark portion with a clean tool and mount it in clean water and search with a moderately high power of the microscope for the characteristic spores of the fungus.

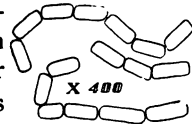


Fig. 3. Microspores of the Pineapple Disease *Thielaviopsis ethacetica*. These spores are smaller than the macrospores and more transparent. They are also produced in a different manner, as shown in Fig. 4, arising inside the mycelium and being pushed forth from the broken end of mycelial cells. These spores germinate at once and serve to keep the disease in active propagation. Their existence is a transient one.

If the tissues are only recently invaded, it may be that no darkening has yet taken place. In that case the darkening may be quickly induced by giving the tissues access to air. If a cane cutting in the early stages of the disease, while its tissues are still only in the red stage, be split open and put back together and laid in a still place, such as a drawer, in the course of twelve hours its tissues will often assume the dark appearance due to the formation of the macrospores of the fungus. These spores may then be examined and the diagnosis thus completed several days earlier than would otherwise have been possible.

The structure of the fungus is such that apart from the formation of the spores it may be provisionally identified from the mycelium. This arises in most cases from the germination of the microspores or the macrospores. It is not often, in all probability, that the disease is transferred from one host to another by means of the mycelium.

The microscopic appearances of the various parts of this fungus are well shown in Fig. 4. The mycelium, at first colorless, becomes at last light to dark brown, though never of the latter color except in the fully decomposed tissues of the heart of the cane. In the partly discolored and the reddish tissues associated with the onset of the disease the mycelium is nearly always colorless. The mycelial cells are from three to ten or more times as long as broad, and contain refractive bodies, more particularly in the neighborhood of the spore-bearing branches. It varies in thickness from three to eight micromillimetres, and is extensively branched, the longer branches naturally lying in the same direction as the axis of the cane.

#### APPEARANCE OF THE SPORES.

The thin-walled microconidia, which germinate so easily and hence serve to spread the disease rapidly, are formed in

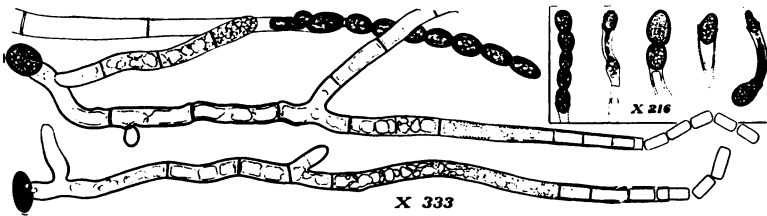


Fig. 4. Mycelium of the fungus causing Pineapple Disease, *Thielaviopsis ethacetica*. This mycelium is abundant in the pinkish, reddish, brownish and black tissues of cane attacked by this disease. It is a well characterized mycelium and it is possible to identify it with some degree of certainty, especially by means of the following test: If the fresh tissues containing the mycelium be cut open and exposed over night to the air in a moist situation, the mycelium rapidly produces the dark colored macrospores characteristic of this fungus.

The larger figures are taken from a hanging drop culture, while the figures in the rectangle in the upper right hand corner are taken from specimens found among cane tissues. Two spores are shown to have germinated in the hanging drop culture and to have begun the production of chains of microspores as described in the text. Above may be seen a chain of the darker colored microspores mentioned in the text.

The five figures in the small rectangle may be described in order thus, beginning at the left: First, a chain of the elliptical darker colored microspores; second, a macrospore proliferating; third, regular formation of macrospores; fourth, single microspore in process of formation from inside a small branch of the mycelium; fifth, spore germinating and producing a single microspore.

the cells of special nearly colorless branches of the mycelium about one hundred micromillimetres long and of varying diameter according to the part measured, being widest considerably behind the middle (8—10 micromillimetres) and from

thence tapering to the open end from which the microspores are escaping. These are cylindrical, nearly colorless, measure about five micromillimetres in diameter by ten to fourteen micromillimetres long, and occur in or outside the cells of the mother mycelium in numbers up to twenty, but generally less than half this number. These spores are sometimes seen to be of smaller size, ellipsoidal form, with a thicker wall and darker color. These dwarf spores are, however, produced row-wise inside the cells of the mycelium, and all possible intermediate stages connect them with the regular microspores.

The dark-colored macrospores, which in the later stages of the attack impart to the diseased tissues their dark color, are borne in an entirely different manner and have an entirely different function. They are far larger than the microspores, measuring  $10-12 \times 16-19$  micromillimetres, and are more or less ellipsoidal in form. The brownish to blackish wall is thick and impervious. The ends often indicate the position of the previous attachments, so that the contour is not exactly ovate or ellipsoidal. Though these conidia are usually borne in chains at the ends of special branches it is not infrequent to find them borne singly. This is usually brought about, I think, by the falling away of all the members of the chain except the proximal one.

The microconidia germinate promptly and easily, merely in the presence of moisture. The macrospores germinate with much greater difficulty, and only after a period of rest.

From this quotation the reader may acquire a very fair idea of the fungus as it occurs in cane. The characteristic pipe mentioned in connection with the stalk of the cane plant is never seen, of course, in the pineapple. Moreover, the rot presents certain peculiarities in the pineapple that call for special mention. These points will now be taken up and discussed in order.

#### THIELAVIOPSIS IN PINEAPPLE.

Taking sections of one of the carpels at a point a few millimeters from the surface of a pineapple that has only just begun to show traces of the sooty blackness due to the formation of the black macrospores, and at a distance of two to four inches from the dark macrospore formation, one may see that the already watery tissue is mainly composed of the mycelium of the *Thielaviopsis*. The mycelium is easily distinguished, as it is darker in color than the other tissues and than most mycelium. In this colorless part one may see that the formation of the microspores precedes that of the macrospores.

The microspores arise in the mycelium of lesser diameter, and appear to form first in the vicinity of the vascular tissue of the pineapple. The rather dark mycelium, which owes its color partly to the refractive nature of its numerous granules, gives rise to colorless elongated non-granular microspores, each generally with a single excentric refractive body.

A remarkable growth of the microconidia was produced by the following procedure. A pineapple so far rotted that the macrospores had appeared for about an inch at the base of the core was halved by an axial longitudinal cut. An examination of the tissues showed that the mycelium was present in great quantities even near the surface of the rind almost to the very tip of the fruit. The tissues were watery and the juice of the fruit was exuding on to the surface on which the pineapple lay. The fruit was so soft it had to be handled carefully in making the section to avoid breakage.

After eighteen hours a frosty-looking growth had appeared on the cut surface of the pineapple, which had meanwhile lain exposed to the air. The first thought was that the growth was immature penicillium, but a casual glance threw doubt on this supposition. Then, for an instant, I wondered whether crystallisable salts in the fruit had possibly crystallised and formed a surface incrustation as a result of evaporation. These random thoughts are mentioned merely to illustrate the appearance of the growth. An examination showed that this growth was purely microconidial and *aerial*. The chains or spores were either isolated or grouped in contact, and the depth of the growth was fully one millimeter at its deepest part. The appearance under a two-thirds objective was that of a deposit of hoar frost. At the base of this growth of microconidia, and in the wet tissues of the pineapple, the macroconidia were in process of formation, and many were already fully formed, so that the tissues acquired a dark color.

The appearance of the chains of microconidia was not that ordinarily seen when these are produced in the tissues of the fruit. Under such circumstances the conidia are to be seen forming in the mycelium of the fungus, and after they are complete they are pushed forth from the ruptured ends of the cylindrical mycelium. The walls of the spores can be seen to be entirely separate from that of the mycelium. In the case of these aerial microconidia, however, the appearance was entirely different. The conidia were in moniliform chains of the most beautiful regularity, the spores remaining joined at the central part of the area between them, so that the appearance was that familiar in the case of the aerial conidia of *Sphaerotheca pannosa* and other Erisyphaceae. Outside these

chains of spores no mycelial wall was to be seen. In fact, it appeared that the spores had formed merely by the segmentation of aerial mycelium, which, however, originated internally from other mycelium. For these spores the name aerial conidia is at once descriptive and noncommittal. It is evident to me from my studies of this fungus that its various forms and activities are as yet but imperfectly understood.

The further history of the aerial conidia is as follows: In the course of twenty-four hours the white coloration due to the mass of these spores becomes darker owing to the slight darkening of the spores themselves, but more particularly to the growth of ordinary macrospores from the mycelium below. The chains of aerial conidia placed in water no longer remain intact. They break up almost without exception. The spores

have the dimensions shown in the adjacent table. If	
7.5	3.95
8.5	5.7
7.5	3.95
8.9	5.45
7.9	6.8
5.7	4.2
7.1	7.1
10.9	6.3
9.5	5.45
10.2	4.9

they are placed in proper nutritive fluids they germinate promptly. The first indications of germination is a change in the form of the spore, by which it becomes nearly spherical. It then germinates from what was the side or the end of the spore, apparently more often the side. It is often difficult to say what part of the spore produced the hypha, so perfectly round do they become before germination. In the course of 12-15 hours the mycelium, which is colorless and more or less regular in form and direction up to this stage, may be 25 times as long as the swollen spore is wide. The mycelium is septate, the cells being 5-15 times as long as wide, and each hypha containing several such cells. Up to this stage the hyphae are little, if any, branched. The present description is made from the germination of spores that had passed through the intestinal canal of *Eristalis punctulatus*, Macq., the commonest Syrphid fly around Honolulu, but there is no reason to suppose that the germination of spores that had passed through this insect would present any peculiarities worth mention.

#### THIELAVIOPSIS AND FLIES.

If some of the sooty black mass be taken from a pineapple and be forced gently through the meshes of the finest miller's silk sieve, that is, a sieve of about 100 microns square (1-250 inch) in the clear, the macrospores may be separated out in considerable purity. By accumulating these spores in a watch glass of water, and assembling them with the aid of sedimentation and rotation, it is very easy to procure them in such numbers



that every small drop of 10 millegrams weight will contain thousands. Using such a concentrated spore sediment as a solvent for grains of sugar it is not difficult to prepare a fly-food such that if the spores survive fly digestion it is easy to test their subsequent germination. As a matter of fact, some flies exercise a considerable choice in the size of the solid particles that they ingest. They are supplied with a sifting apparatus by the aid of which they can exclude particles exceeding certain dimensions. It appears, however, that the

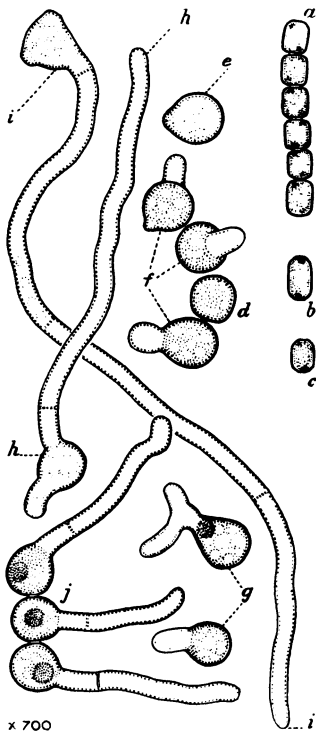


Fig. 5. Explanation of the figures of aerial conidia of *Thielaviopsis*.

Eleven spores germinating, and eight that have not yet started to germinate. *a*, a chain of six aerial conidia as they occur when attached to the parent mycelium. *b*, *c*, two spores showing some of the extremes of size and form; *d*, a spore that has swollen and become somewhat spherical preparatory to germination; *e*, a spore that has become spherical and started to send forth mycelium at the left hand side; *f*, three spores a stage farther advanced than that at *e*, these three spores being part of the same chain as that marked *d*, but all now separated; *g*, two spores still farther advanced than those at *f*, one of them having started to branch at a much earlier stage than is usual with this species; *h*, *h*, spore whose hypha has one septum; *i*, *i*, spore whose hypha has two septa; *j*, three spores still attached to each other that have nevertheless germinated.

The spores *a*, *b*, *c*, have been mounted in water and drawn at once. The remaining spores have been passed through the fly *Eristalis punctulatus*, a common Syrphid fly, and afterward germinated in pineapple juice. The passage through the fly makes no difference in the germination of the spores. The spores *a* to *c* would, if placed in pineapple juice, germinate in precisely the same manner.

macrospore of *Thielaviopsis* is somewhat below these dimensions. At any rate, the spores are ingested by various common species of flies belonging to the Muscidae, Sarcophagidae and Syrphidae. All the species I have tried are such as normally search out and prefer saccharine food. These take in the *Thielaviopsis* spores with sugar solutions artificially prepared as described, and the spores pass through the insects with little if any apparent alteration. From one to a dozen or more spores are to be found in each portion of excrement

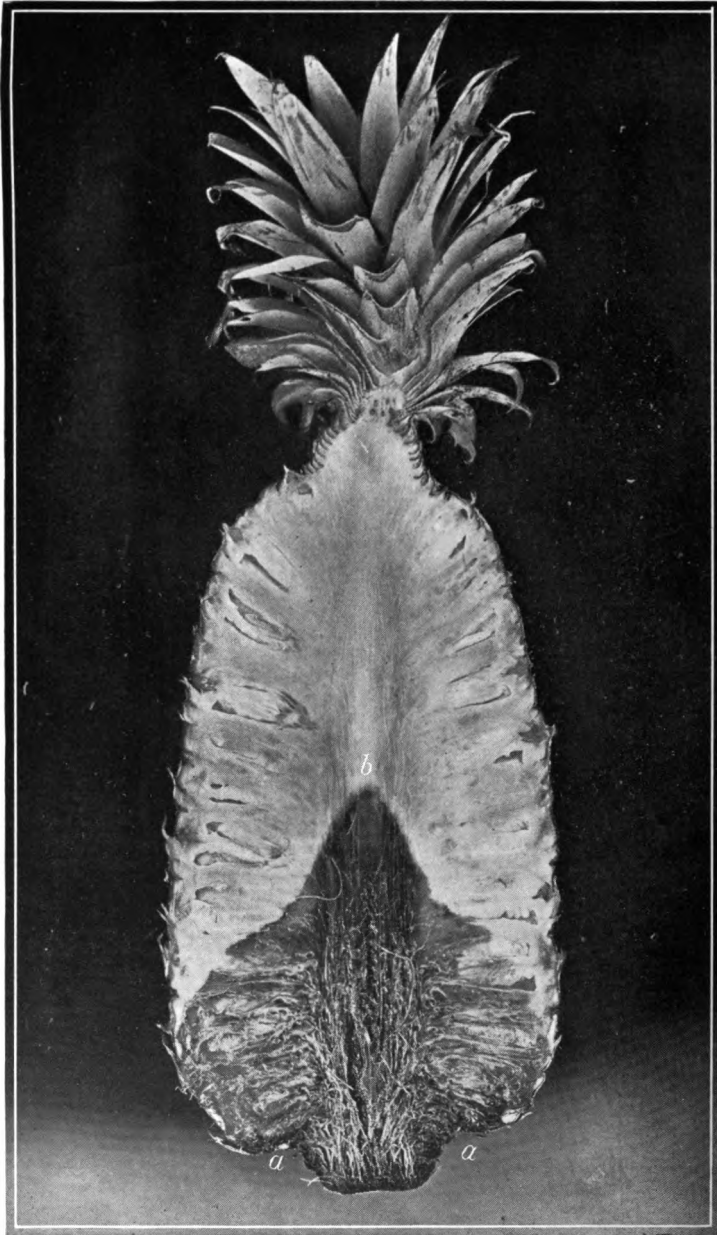


Fig. 6. Diseased pineapple about one-third natural size. *a, a*, angle at the base of the fruit where the disease found an entrance owing to the presence of insect wounds; the dark portion shows the nature of the advance of the rot upward through the fruit. The dark color is due to the formation of the black macrospores of the rot-fungus, the mycelium of the fungus being really considerably in advance of the dark coloration; *b*, apex of the visibly rotten part. It will be noted that the fungus advances most rapidly along the fibrous part of the fruit.

passed. Some of these spores are broken, but no greater proportion than before ingestion. The breakage is due to the treatment with the sieve. Even the microspores appear in the excrement apparently unaltered. In the same manner the aerial conidia of this fungus collected in water slightly sweetened may be fed to flies with the result that they pass through the alimentary canal unaltered.

All these spores germinate readily after passing through the canal of the flies. It appears to make little difference what fly is used so long as it is a species that is accustomed to seek saccharine fluids as food, or is omnivorous and accustomed to saccharine food. In all such cases the spores, if passed through the fly in what seems to be the normal way, will germinate afterwards. If the fly has a good supply of food, in other words, all that is desired, the passage of the food through the most common species requires only a short time. The principle of the fly's digestive economy seems to be the use of large quantities of food and the absorption of only what is readily soluble. Thus, in the case of spores placed in sweetened water, only the saccharine matter is absorbed. The spores, even when they are rather frail and thin-walled, suffer little if any diminution in vitality by passage through the fly. *The consequences of the general statement thus made are almost beyond conception. The relations of flies, not only to the pineapple disease, but to diseases of all sorts, is thus shown to be of the very greatest importance.*

The location of the pineapple rot is largely determined by insects, and its spread from one plant to another is largely the result of insect work. The mealy bug, as it is called, of the pineapple naturally seeks protected places where it can find food of the right nature. The protected places are the lower angles between the carpels on the lower part of the fruit and beneath the lower leaves of the top. At these points it seeks out the tender places where it can insert its proboscis for the purpose of sucking up its food. As the fruit grows there is a gradual opening out of the angle between the carpels by which new epidermis not hitherto exposed comes to the light and air. It is through this tender epidermis that the insect prefers to insert its proboscis. At the apex of the fruit, just below the lower leaves of the top, is another location where the insect finds similar congenial conditions. The location of the insect determines to a considerable extent the cracking of the fruit, and it is through the cracks following on the results of the insects' punctures that the rot finds an entrance. Hence the rot is most common at the base of the fruit and at the top. Occasionally the blossom end of a carpel will be suffi-

ciently open to allow the entrance of one of the young insects, so that we find the blossom cavities not infrequently inhabited by the insect. But this is not so common nor so injurious a feature as those just mentioned.

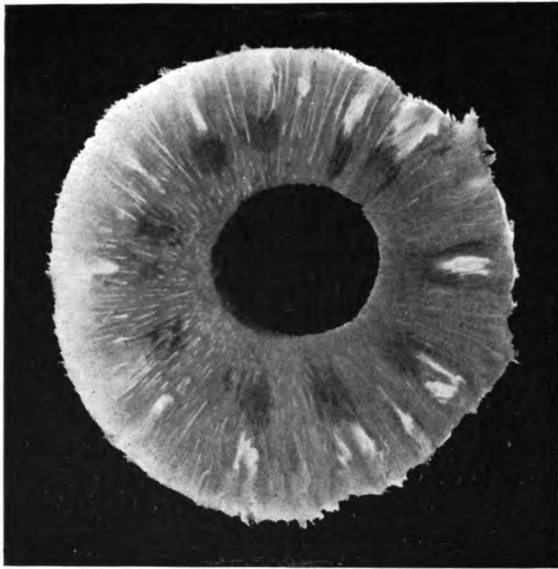


Fig. 7. Slice of pineapple from a tin that had "gone bad." It will be noted that there are dark stains to the number of about ten. These stains correspond in position with the bundles of fibres that pass to the different carpels of the fruit. This again shows the tendency of the rot to pass most rapidly through the most fibrous tissue. It is not certain that this slice was affected with the *Thielaviopsis* fungus.

From these facts we may draw most important inferences as to the treatment necessary in order to prevent the attacks of the rot. The problem involves entomological as well as fungus factors, as is not infrequently the case when we come to study the full life history of a fungus.

First let us deal with the entomological part of the problem, as that is more easy of comprehension, in that it deals with an organism apparent to the unaided eye. If one looks attentively at a pineapple, and especially if he takes the trouble to probe a little with a pocket knife and to look about with a pocket lense, he will easily confirm what has been said as to the habitat of the mealy-bug of the pineapple. It is most abundant at the base and at the top of the fruit. At the top it is the habit of the insect to push its way into the axils of the leaves, and as one removes leaf after leaf at the base of one of the

tops he will be surprised at the narrowness of the crevice into which one of the flat young larvae of the insect can crawl. It is perhaps for this very purpose that the young insect is so very flat.

Observe how important a factor this is in the life history of the insect. All the young insects that have the instinct to force their way in among these top leaves stand a good chance to be transplanted along with the top. When the top is planted in a new field it takes root, and as it grows it gives rise to new parts that accommodate the insects, so that these latter propagate to advantage. It is for this reason that the bulk of the insects are to be found at the base of the fruit. A few of them, however, wander to the top, and it is these that help carry the blight over to the next crop of pineapples.

The precaution suggested by these facts will by this time have become patent to any reader. When the tops are removed for the purpose of planting out, the greatest care should be exercised to see that none of the scale insects are transplanted

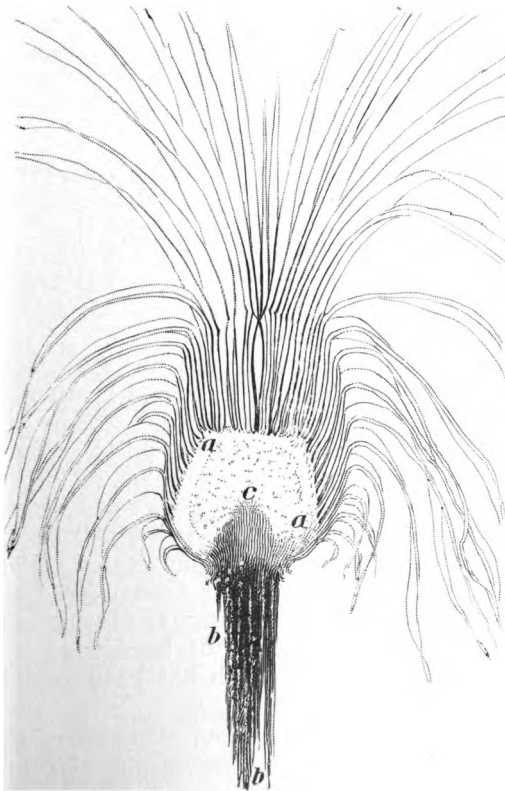


Fig. 8. Top pulled from a rotten pineapple to show that the tissues of the top are subject to the attacks of the *Thielaviopsis* fungus. *a*, *a*, sound tissue of the top; *b*, black fibers pulled from the rotten part of the pineapple and carrying multitudes of spores, so many that the fibers are black with them; *c*, point to which the discoloration due to the rot extends; the fungus mycelium, that is the disease, will be found some distance in advance of this point. It is to be hoped that such a top as this would rarely be planted, even after the most severe trimming. The point to be specially noted is that the tissues of the top are subject to the disease. Here we have them attacked. If they are subject to the diseases, they are liable to contract it after being planted, if the soil happens to contain the spores of the fungus.

at the same time. Remove as many leaves at the base of the cut-off top as may be necessary to secure this end. It is better to waste the top than to run the risk of planting out the blight. Any practical person can satisfy himself of the utility of this precaution wherever the insects are abundant if he will take the few minutes' trouble necessary to make the pocket lens examinations described.

Now the ultimate result of this precaution is the prevention of a large amount of rot. The damage the insects do is not so very apparent to the ordinary observer. I think most of the growers with whom I have conversed have shown a comparative disregard for this insect. The losses from it appear to them to be slight. Occasionally a pineapple looks bad with the blight caused by this insect, but the number is not so great as to cause much anxiety. However, when the fruit is shipped, and rots on the way to market, questions begin to arise. Now, the answers to these questions lead back, as we have seen, to this insect. The rot is caused by a fungus, possibly by more than one fungus. But it is the insect that brings the pineapple into the condition that gives the fungus its best chance. No doubt the fungus would in any case ultimately find its way into the pineapple; still, the insect helps it to find a way in much quicker than would otherwise be the case.

Another point to be attended to by the provident planter is the complete destruction of pineapple refuse. All such refuse contains the material necessary to start the disease afresh in new fields, and it is truly wonderful the number of ways in which this may occur. Spores are minute things,—too small to be seen by the unaided eye. Their abundance is enormous. It is indeed difficult to overstate their abundance. Almost any moving object will be found more or less likely to carry them from place to place. They become detached from their place of origin and are washed away by water, or lifted by the wind, whirled aloft and it may be scattered for miles around. Failing this they may be carried by moving animals, including insects and man. The ubiquitous fly carries all sorts of minute objects of this kind on its feet. There is a small beetle that is almost invariably found in rotting pineapples. This beetle daubs itself with spores and in passing from one fruit to another it carries the spores of the fungus, causing the pineapple rot. This chain of thought might be carried out to an almost indefinite extent. But enough has been said to indicate its importance.

The "mealy-bugs" are attended by ants. I am not aware of the precise relations between the ants and this particular species, but

it is known that in some cases the ants take the trouble to carry aphides from place to place in order that the aphides may thrive. Thus when the pasturage for the aphides becomes poor, the ants remove them to better feeding-grounds.

Whether these mealy bugs wander from the base of the pineapple to the top in order to establish new colonies I do not know. It is possible that they may be carried from the base to the top by ants. Such a thing would be no more wonderful than many of the things ants are known to do in this connection.

At any rate, it is certain that the mealy bugs in some way find their way from the base of the pineapple to the tip.

### PINEAPPLE ROT.

(That is *Thielaviopsis ethacetica*, Went.)

Pineapples carried off by *Thielaviopsis* often rot from the top. In this case the fungus makes its way down into the pineapple by way of the fibers of the core, as may be easily seen when the characteristic black color develops. The same or similar phenomena occur when the rot makes its way in at the side of the fruit, as it less frequently does. The reason the rot enters at the bottom or the top has already been indicated. It is because the insect attacks, apparently necessary as a preliminary, occur principally at the bottom and the top of the fruit.

In its final stages, a fruit that has rotted from above will permit of the easy removal of the top. It pulls away easily and the black fibers of the core of the fruit come away like a sort of root system. This is shown in Fig. 8, which illustrates, in an exaggerated way, what may take place in using tops for new plantations. In the case illustrated, there would be no question in the mind of anyone that some of the rot is taken away with the removed top. It can be seen. Now, if in such a case the lower part of the axis of the top be examined it will be seen that the rot ceases a little way into the top. The black color of the rot can be seen in the hard tissues of the center of the top. The fungus actually extends some distance beyond the black coloration. This is an important matter to understand, because it shows how a planted top may contract the disease. It may even be that through carelessness such a top with rotten tissue at the bottom is planted. The more important thing to note, however, is that this observation proves that the *axis of the top can contract the disease*. The tissues of this part of the pine-

apple are such that they afford a suitable food for the fungus to grow in. Not perhaps the best of food, but, at any rate, such that the fungus can live. Now, if that is the case, it is evident that any top planted out in an infested field stands a chance of contracting the disease. In just such proportion as its tissues are suitable food for the fungus, in that proportion it will be liable to become diseased if it is exposed to the fungus. *This shows how important it is to keep the soil of the pineapple plantation as free as possible from this fungus.*

It will be noted that the fungus does not penetrate beyond a certain distance into the top. From this it is evident that at a certain point the tissues become less suitable to the fungus than they are lower down. From this we may correctly argue that, when planting, the removal of the tissues from the lower part of the pineapple top is a wise precaution, as the lowermost tissues of the new plant will then for some time offer some resistance to the attacks of the fungus should it be present in the soil.

#### THIELAVIOPSIS AND BORDEAUX MIXTURE.

Experiment has shown that cane cuttings can be protected from the bad effects of pineapple fungus, that is *Thielaviopsis*, for weeks, or, it may be, months, in some cases, by the application to their ends of fungicides such as Bordeaux mixture or tar. The facts of the case are presented in Bulletin No. 5 of the Hawaiian Sugar Planters' Association, Division of Pathology and Physiology, to which the reader is referred.

Field inoculation showed the power of the *Thielaviopsis* of the pineapple to infect cane cuttings, so that there is no probability that the two sorts of *Thielaviopsis*, that is, that from the pineapple and that from the cane, are two different races. They are one and the same, and hence it follows that in all probability the experiments carried out at the Planters' Experiment Station are directly applicable to the pineapple. This means that the rot can be prevented from entering the pineapple "set" for some time by simply smearing the cut end with Bordeaux mixture or tar. It is probable that in time, even if not at present, this is an operation that will pay well, for the reason that it will enable the "set" to establish itself to better advantage. The pineapple tops need not be dipped—only smeared at the cut end.



## ROTS OF THE PINEAPPLE AS AFFECTING THE TINNING OF THE FRUIT.

There are a number of rots of the pineapple that affect the fruit in such a way that it often comes to the factory for tinning in a state that calls for special action. If the fruit is attacked in one small part only and the rot is in its initial stages, it may be possible to utilize the portion of the fruit not attacked. Such fruits naturally will form a second-grade product.

Another question of importance in this connection is the transition of the fruit from a ripe or healthy condition to the rotted condition. This change may be of such a nature that it is not easy to detect the early stages of the rot. In such cases there is danger that fruit in the incipient stages may find its way into the first grade. In appearance it may be up to grade, but the presence of the rot, though it may not affect the appearance, does affect the flavor. The lack of bouquet, or it may even be bad flavor, develops after the fruit has been canned for some time, when the evil has spread from one or two bad slices or places to the other parts of the tin. It is important for the consumer, as well as the packer, to know the appearances that indicate an unsound tin of pineapple.

It is usual to speak of tinned pineapple of the kind as "over ripe." This is only another way of saying that it is infested by some fungus of microbe,—in the case of pineapples, probably some fungus.

The golden rule is to become familiar enough with the appearance of first-class fruit to know it at sight, and to be very suspicious of anything that has any other appearance. This is possible for the packer and his employees, but it is not an easy thing for the consumer, who, it may be, buys only occasionally. The accompanying photograph shows the appearance of fruit of second quality or deleterious quality.

### EXAMINING PINEAPPLE THAT HAS BEEN CANNED.

The examination naturally is directed toward the isolation of any fungus elements that may exist in the discolored areas. At first the cellulose walls of the pineapple cells present appearances that need to become familiar to the observer. Then the nuclei of the pineapple cells simulate organisms in some instances. The granules of the protoplasm also simulate microbes. After one has become familiar with the more or less deceptive appearances he is ready to go on with the search for the traces of deleterious organisms.

Where the cell nuclei of the pineapple are unaltered, and the granular appearances indicative of the protoplasm are present, one naturally does not expect to find traces of such organisms in abundance. On the contrary, where the cell nuclei are absent, and the cells show other indications of disorganization, there the observer pauses to look carefully in the hope of finding the culprits that are responsible for the poor quality of the pineapple or the "going bad" of the tins.

One of the most abundant organisms in tins that have swollen or have burst through the action of ferments are the yeast organisms and similar cells. These will be present in all tins that have the ordinary odor of fermentation. In cases where the odor differs from this characteristic, alcoholic or sour odor of fermentation, the organisms will be different and may even in some cases take on the character of mycelium.

It is not often, however, that one may expect to find living mycelium. More often the mycelium will be such as was present before the cooking process, and therefore such as has been altered by that process. In general, the stained portions where the cells are most altered have a definite relation to the location of the fibrovascular bundles of the fruit. The axis of the pine is composed largely of fibers or fibrovascular bundles. From place to place the central bundle of fibers gives off groups of strands or fibrovascular bundles, these bundles corresponding in number with the carpels or points or prickles on the surface of the fruit. When a slice of pine is discolored as shown in the photograph, it will be found that it is these groups of bundles that are stained, and that the stain is therefore associated with the vascular axis of the carpels. So far as the stains extend, there are as many stains as there are carpels. It is a noteworthy fact that the fungi of pineapple diseases are associated with staining of the fibrovascular bundles, very likely because they have very definite relations to air. Air is present in the bundles, and it is this fact, perhaps, that determines the line of attack of the fungus. When the pine goes wrong from the root end, as is sometimes the case with *Thielaviopsis*, it is easy to see that the effect must be about that seen in the case of the slices that have "gone off" after tinning. The chemical influence of the rot will extend in advance of the rot along the vascular bundles, as in the case of cane and other plants.

In spite of all precautions, it is to be expected that some fruit will rot on the field. What should be done with this rotten fruit? It should be destroyed, by fire or otherwise. Moreover, the stumps of such rotten fruits should be immediately dug up and destroyed at the same time. All the

stumps that are left on the field are more or less liable to take the *Thielaviopsis* rot, and for this reason it is very desirable to remove these stumps rather than let them rot on the field. If they rot on the field they are pretty sure to become a factor in the generation of some disease of the future crop. So long as pineapples are to follow pineapples, the greatest care should be exercised to *keep the fields clear of rotting or decaying parts of pineapple plants, whether fruit, leaves or roots.*

The industry is expanding rapidly in Hawaii, and in consequence tops are worth two or three cents each. All tops that will grow are being used, to a large extent, regardless of whether they are diseased or not. If the top fails it is replaced by another. This at first may seem to be an economical operation, as it gives the poor top a chance to show what it can do. If it fails, another can be put in. But the *ground at the place of this failure becomes infested*, hence the practice is a bad one, taking the future into consideration.

The old stumps are for the most part being plowed in. This is a bad practice where pineapples are to be followed by pineapples. Examination of the old stumps shows that they are infested with fungi, among which is *Thielaviopsis*, and when this is the case this disease is being encouraged by allowing the stumps to remain. There seems to be some little attempt to burn the trash, but too little. All pineapple trash is inimical to subsequent pineapple crops.

Where the water stands about a plant in the early stage, before it has established itself, the plant suffers and often dies. This is due to disease, often *Thielaviopsis*, entering at the base and getting ahead of the roots of the plant. Proper drainage will remedy this local dying off of young plants.

On some low lands the plants become yellow and die off, or, at least, do not do well. This is a separate malady. The soil at Wahiawa, Oahu, is said to lack lime. If this is so, liming should be tried, especially at the low and poor patches.

Plants occasionally die from the attacks of one or more fungi on the leaves. For a long time in advance of the actual appearance of fungus fructifications these diseased leaves may be picked out by their different color. The attack begins at the tip of the leaves and works back. In any event, sooner or later, these fungi attack the leaves, and it is probable that a closer study of some of them might disclose facts of importance in reducing losses. I have made a number of notes regarding some of these fungus species which may be worthy of publication at some future time.

It is evident that at Wahiawa the common ripe rot of the pineapple is *Thielaviopsis ethacetica*.

Carpophilous beetles are very common, and these, no doubt, spread the *Thclaviopsis*, as is the case with this fungus in cane fields. If old stumps and worthless fruit were promptly destroyed, the beetles would be less harmful in spreading this fungus.

Flies are very common about the canneries, and no doubt serve to spread some of the diseases, as noted on pages 130-131. It is very difficult to see how they can be kept out of the canneries without expensive screening. The neighboring stables are fine breeding places for flies. The dung heaps should be screened, or, at any rate, so treated as to reduce the flies. This is an operation that will amply repay the cost.

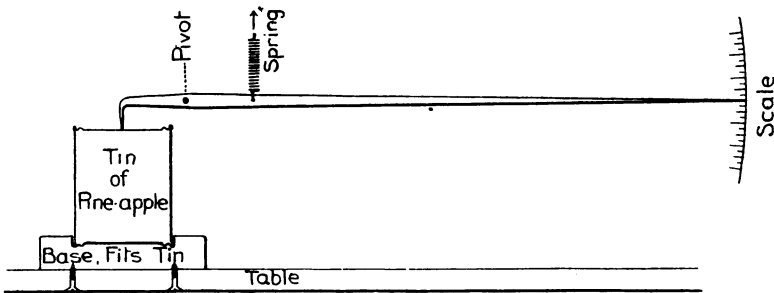


Fig. 9. Sketch of a caliper for tinned fruit.

In the course of my investigations on tinned fruit it has been necessary to know what tins were swelling, and the rate of swelling. The accompanying figure will illustrate the nature of an apparatus I have devised for this purpose. It is simply an application of the ordinary, spring micrometer caliper. Such an instrument may be of use in pineapple canneries, and for that reason the illustration has been inserted. The tin to be adjusted is placed on a base which fits it and holds it in such a position that one end of the caliper lever touches the center of the top of the tin. It is necessary that this adjustment be such that whenever a tin is reinserted in the apparatus, so long the tin remains constant the caliper point will assume its former position. The apparatus will be readily understood from the lettering. The caliper lever is pivoted so that the short arm is next the tin to be tested and this arm may be made any number of times shorter than the long arm which swings past the scale. The scale may be arbitrary or it may be made to indicate a given length of tin, the zero of the scale being naturally the upper surface of the baseboard which receives the tin. The apparatus should be constructed of light metal and be of such character as to be permanently accurate. It need not be expensive. Such an instrument would be of use to the Manager of a cannery in investigating the rate at which tins of pineapple change owing to the various circumstances that occur during the manufacture and trade in his product.

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## COLLEGE OF AGRICULTURE AND MECHANICAL ARTS.

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### APPOINTMENT OF THE BOARD OF REGENTS.

The Governor has appointed the following Regents of the College of Agriculture, who have been confirmed by the Senate: Messrs. W. G. Smith and A. Gartley for the term of three years; Messrs. Marston Campbell and C. F. Eckart for two years and the Hon. H. E. Cooper for one year.

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### NOTICE FROM THE DIVISION OF ENTOMOLOGY.

The Entomological Division of this Board wishes to inform Hawaiian readers of this magazine that it is always ready and anxious to receive, study and report upon any insects that they may find and submit. When feasible either colonies of beneficial insects will be sent, or simple, inexpensive remedies will be prescribed. No charge.

# THE HAWAIIAN FORESTER AGRICULTURIST

VOL. IV

JUNE, 1907

No. 6

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## OUR NEW COLLEGE OF AGRICULTURE.

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ITS WORK, OPPORTUNITY AND FUTURE.

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### *Farmers' Institute Meeting.*

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The recent action of the legislature in setting aside an appropriation to found a College of Agriculture and Mechanic Arts in the Territory, was the occasion of a special meeting of the Farmers' Institute of Hawaii at Oahu College, on May 25th last. A representative gathering of prominent agriculturists and educationalists was in attendance, and the future sphere of work of the new institution was fully discussed. Among the speakers of the evening who had kindly consented to present certain phases of the subject were members of the Board of Regents of the new College, the President of Oahu College, the Principal of Kamehameha Schools and other gentlemen. The following addresses were delivered:

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### MODERN AGRICULTURAL EDUCATIONAL IDEALS.

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*By Jared G. Smith, President Farmers' Institute of Hawaii.*

The land-grant colleges, established by the Morrill Act of 1862, are in every instance a joint product of the Congress of the United States, and the legislature of a given State, that is, of the Nation and the State combined. The Morrill Act of 1862 prescribes the scope of instruction at the college as being: "Without excluding other scientific and classical studies, and including military tactics:" to teach "such branches of learning as are related to agriculture and the mechanic arts, in order to promote the liberal and practical education of the industrial classes in the several pursuits and professions of life." The second Morrill Act of 1890 provides for education in "agriculture, the mechanic arts, the English language, and the various branches of mathematical, physical, natural, and economic sciences, with special reference to their application in the industry of life."

Senator Morrill, the author of the organic laws under

which these institutions have been established, has in his public writings often voiced his own interpretation of the original intent of the laws. He urged that the object of these colleges was "to give an opportunity for those engaged in industrial pursuits to obtain some knowledge of the practical sciences related to agriculture and the mechanic arts, such as they could not have obtained at the classical colleges. It was never intended to force the boys of farmers going into these institutions so to study that they all should become farmers. It was merely intended to give them an opportunity to do so, and to do so with advantage if they saw fit." I quote again, "The Act of 1862 proposed a system of broad education by colleges, not limited to a superficial and dwarfed training, such as might be supplied by a foreman of a work shop, or a foreman of an experimental farm." "If any one would have only a school with equal scraps of labor and of instruction, or something other than a college they would not obey the national law."

The College of Agriculture of Hawaii is the forty-ninth institution to be established under the general provisions of the national organic laws. The agricultural college is of necessity a part of the public school system of the Territory. It is "the people's university." Some of its requirements are that tuition shall be free to students resident in the Territory, or as nearly so as conditions will permit. The course of study must be such as to meet the wants of the people at large. "Whatever limitations other institutions may with propriety prescribe, this Agricultural and Mechanical College must have regard to what the people want to know and to do." The public high schools and preparatory schools should be accredited or approved by the college in so far as their work is worthy of approval, so that good students upon completing their studies in the secondary schools may find a natural entrance to their college unobstructed by terrifying examinations. A close, intimate, and friendly relation with the secondary schools must be maintained. The college should stand for the best ideals in education from top to bottom, and it should make higher education as attractive as possible to the average citizen. Its relation to the public school system is simply to complete the work already begun; to gratify the ambition already inspired, and to make of the average man who wishes it, a strong, capable, useful, high-minded, broad-visioned citizen. Training for mere manual skill should be eliminated from courses that lead to degrees. Not one of the mainland agricultural colleges now require compulsory manual labor. The labor now required in agricultural colleges is on an educational basis, mainly laboratory work.

The ideals should be high. The institution established by the Legislature of 1907 is fortunate in that full and complete



advantage can be taken of the experience, failures and successes achieved during the last forty-five years by the older colleges on the mainland. The key-note of the whole system of the State Agricultural Colleges is that which is emphasized in the fundamental law that the education must be a *liberal* one. The ideal should not be to train the men and women to fill some particular niche in life, but to produce, rather, broad and well rounded men, capable of succeeding in any walk of life. As a dual organization having a direct relationship with both State and Nation, it must give its students training in the humanistic as well as the most advanced technical ideals. As a prominent educator has recently said, "there is too much illiteracy among college graduates." Scientific teaching is essential, but the foundation should be upon broader lines, so that the product shall not be a half-educated specialist;—teaching the students that "the only way to have the good opinion of all the people all the time is to deserve it; and that the only thing of permanent value in the universe is character." A liberal education must embrace an acquaintance with some other languages than our own, in order that we may know how other men think, reason, imagine, or express themselves in oratory and song. The study of literature, to acquaint the student with its buried wealth of thought and life, that he may know mankind at its best; history, for its lessons in humanity, its teachings of law and liberty, motive, passion and action, and the progress and development of human life; political science and economics, that the men who go forth shall become the makers of opinion and a source of action in a free state; psychology and ethics, the sciences of mind, thought, and conduct; military science, because the progress of civilization is intimately dependent upon it; religion, because the thinkers and leaders of our civilization must have that reverence for the divine side of human nature which is the guardian and inspiration of all the rest. These are the broad humanistic studies in the university man's preparation for a full and liberal life.

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#### *ACTS FOR THE ESTABLISHMENT OF LAND GRANT COLLEGES.*

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*By Hon. Henry E. Cooper, Regent of the College of Agriculture.*

The Agricultural Colleges of today look to the Morrill Act of July 2nd, 1862, as the law that has provided for their organization and maintenance. On the 14th day of December, 1857, Hon. Justin S. Morrill of Vermont, Chairman of the Committee on Agriculture, introduced in the House of Representatives a bill appropriating to the several States a portion of the public lands for the purpose of encouraging institutions for the advancement of agriculture and mechanic arts. Strange

as it may appear, opposition to the bill manifested itself at once and four months after its introduction the Chairman of the Committee on Public Lands, Mr. Cobb of Alabama, reported the bill adversely but it finally passed the House of Representatives by a small majority and passed the Senate in the winter of 1859. It was soon returned, however, with a veto from President Buchanan. In 1862 the same bill was introduced in the Senate and passed on the tenth of June by a vote of 32 to 7. The bill then went to the House. On the 17th of June it passed by a vote of 90 to 25 and on the 2nd of July became a law by the approval of President Lincoln. Under the Morill Act, the amount of public land was apportioned to each State equal to 30,000 acres for each Senator and Representative in Congress. The lands were to be selected from the public domain subject to private entry and in the event of there being no public land within a State subject to entry, then the Secretary of the Interior issued land script to such State, which could only be located by individuals so that no State could locate or own land within the boundaries of another State. The funds derived from the sale of lands and land script were to be invested in stock of the United States or the States, yielding not less than 5 per cent. interest. The funds so invested were to remain undiminished as a permanent endowment fund, the interest to be used for the maintenance and support of at least one college where the leading subject should be, without excluding other scientific and classical studies and including military tactics, such branches of learning as are related to agriculture and the mechanic arts.

Nearly \$3,000,000 have been derived from the sale of land script issued for the allotment to the State of New York. This fund has been placed at the disposal of Cornell University. Massachusetts was not so fortunate in the disposition of the lands derived under the Morill Act. The share apportioned to Massachusetts was 360,000 acres and only \$207,000 was realized from the sale of the lands; while Kansas received only 90,000 acres, still by judicious selection of lands, something over \$550,000 were realized from their sale. In all about \$12,000,000 have been realized from the sale of land and land script and something over \$4,000,000 worth remain undisposed of.

The next act of importance was passed in 1887, which has been known as the Hatch Act. This had for its purpose the construction of experiment stations in conjunction with the colleges established under the Morill Act. Under this Act \$15,000 was made available for each experiment station out of any money derived from the sale of public lands. Under this last act about \$700,000 annually have been expended on

the maintenance and upkeep of the stations in the several States and Territories.

In 1890 another act of Congress was passed authorizing the application of a portion of the proceeds of the public lands for the more complete endowment and support of the colleges of agriculture and mechanic arts established under the provisions of the Morrill Act. By this last act \$15,000 was made available for each college, this appropriation to be increased annually by addition of \$1000 until the total amount reached the sum of \$25,000. Now the Nelson Act provides an increase in the amount of the appropriation to each State of \$5000 a year for 5 years at the end of which time the appropriation will be \$50,000 annually.

The next act which particularly affects our own people was passed by the Legislature of the Territory of Hawaii during its last session. The purposes of the college of Hawaii are to give thorough instruction in agriculture, mechanic arts and the natural sciences connected therewith and such instruction in other branches of advanced learning as the Board of Regents shall from time to time prescribe, and to give such military instruction as the Federal Government may require. The standard of instruction in each course shall be equal to that given and required by similar colleges on the mainland, and upon the successful completion of the prescribed course the Board of Regents are authorized to confer a corresponding degree upon all students who shall become entitled thereto.

It was quite natural that there should be a diversity of opinion concerning the purpose of the colleges authorized by the Morrill Act, sometimes referred to as the Land Grant Colleges. It was the opinion of some that they were designed as Manual Training Schools, in other words, to attempt to make farmers of the students without respect to scientific acquirements. The purpose for which the colleges were instituted as intended by the original introducer of the bill, Senator Morrill, may be best explained in his own construction of the act.

His idea was to give an opportunity for those engaged in industrial pursuits to obtain some knowledge of the practical sciences related to agriculture and mechanic arts such as they could not then obtain at most of our institutions called classical colleges. It never was intended to force the boys of farmers so to study that they should all come out farmers. Not manual but intellectual instruction was the paramount object. It was not intended that agricultural labor in the field should be practically taught any more than a mechanical trade of a carpenter or blacksmith should be taught. It was a liberal education that was proposed. Classical studies were not to be excluded and therefore must be included. The act of 1862 proposed a system of broad education by colleges

not limited to a provisional training such as might be had in an industrial school.

So much for the present laws under which we are organized and are to act.

We require still further legislation by Congress. Rulings to the effect that Colleges established in Territories subsequent to the passage of the act of 1890 cannot participate in the appropriations, makes it necessary that an enabling act should be passed by Congress making available to the College of Hawaii all Federal appropriations. The appropriation from the Territory will permit of a very small beginning only: \$10,000 for salaries for the biennial period, \$5000 for incidental expenses and \$10,000 for buildings. This will not go very far towards providing accommodation for the many students who will no doubt make application for admission to the college as soon as buildings and teaching force have been provided. What we want is sufficient opportunity to teach the young men and women to be able not only to be successful farmers themselves but to teach others how to avail themselves of the natural advantages which are so little known by those who have not been able to receive a liberal education on scientific lines.

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### AN INTERPRETATION OF THE ACT.

*By Wallace R. Farrington, Editor Evening Bulletin.*

As I understand your secretary's request, an interpretation of the act creating this college is to be discussed by me with relation to its historical origin rather than a legal definition.

Since coming to the Hawaiian Islands I have been struck with the lack of opportunity for advanced education for the youth unable to personally afford or borrow the funds for a course at some mainland college or university.

Shortly before the close of the session of the 1905 Legislature I framed the resolution which was later introduced by Representative Coelho of Maui calling on the Commissioners of Public Instruction to investigate the feasibility of securing the Federal endowment for and the establishment of a College of Agriculture and Mechanic Arts. This resolution was passed without opposition by the House of Representatives and was later passed by the Senate with the amendment proposed by Senator Dickey that the Lahainaluna school should be considered in this connection.

As a member of the Board of Public Instruction I was appointed chairman of the committee to carry on this investigation and report. I visited Lahainaluna and after going over the situation confirmed a preconceived idea that it was not

the institution from which the college could be developed. It is doing a good work in its own sphere. Its graduates are equipped to enter the first or second year of the High School. Hence it is in no sense a college nor does it furnish the basis for one. Its attendance of over one hundred students shows that it has a place to fill as an industrial school. It is also distant from the center of what educational advantages we have in the islands, and to try to make a college of the place would be to guarantee a low grade college and spoil a first class industrial school.

Our report was accepted by the Board of Public Instruction and presented to the legislators. The Governor also took an active interest in the work of getting the institution started. A plank in the Republican platform endorsing the project was secured.

While the Legislature of 1907 was in session everything was in good shape except for the framing of the act creating for the institution. This was an all important detail, and we were fortunate in securing the appointment of a special committee from the members of the University Club. This committee consisted of Hon. H. E. Cooper, C. R. Hemenway and R. S. Hosmer. They coöperated with A. G. M. Robertson and the result was the law establishing and the law appropriating for the Hawaii College of Agriculture and Mechanic Arts. The bills were introduced by Senator Coelho of Maui and were, as has been said by Mr. Cooper, passed without opposition.

Some one has said that the act creating this college should be entitled "An Act to Secure the Federal Appropriation for Hawaii." As one of those having to do with the early work for the institution, I desire to "acknowledge the corn." That was exactly what I had in mind and as I read history the Morrill Act was originally passed to inspire the States and Territories to do just what Hawaii has done and what every other State and Territory of the Union did before us.

While this is a meeting of agriculturalists, I do not believe that the scope of this college should be exclusively agricultural. It should be a college of agriculture and mechanic arts in fact as well as name. It must be if we are to obtain the Federal appropriation. It must be if we are to give our youth an opportunity for a liberal advanced education.

Nor am I altogether in sympathy with the idea that this institution will not be doing its work unless it turns out farmers. I am convinced that each man should determine for himself his future field of work. I shall not consider this college a failure if it turns out more chemists, or mechanical engineers, or civil engineers, than farmers. There is as much reason to claim that a man should put hayseed in his hair and fertilizer on his feet in order to be at home in a farmer's in-

stitute meeting, as to hold that this college must produce only farmers.

I think this college should be in Hawaii what similar colleges are and have been on the mainland—an institution where the young men and women can obtain a college education and follow the course of study that best suits their ambition.

Presumably future legislators of Hawaii will rise up and cry out as they have done year after year in my home State, "Where are your farmers? Where are your farmers?" The college will fill its mission if it turns out well educated men and women, whether they elect to go into the cane field and hoe, or into the chemical laboratory. Its purpose should be to furnish the opportunity for advanced education. If this be satisfied I am willing to leave the rest with the young people of our Territory. I believe the college will be here as elsewhere in the country—a perfect success.

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#### EDUCATIONAL STANDARDS FOR THE COLLEGE OF AGRICULTURE AND MECHANIC ARTS.

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*By Arthur F. Griffiths, President Oahu College.*

The more I consider this problem of the founding of the new College of Agriculture and Mechanic Arts and the establishment of proper courses in it, the less easy seems the solution. It is going to be difficult for instance to plan a course for a college which has no site or buildings or students in a country where there are no farms. It is not going to be possible to follow entirely, or much, the lines laid down by the experience of other colleges; it is not going to be wise to do so.

As I understand it, the desire of the Regents of the college in Hawaii is so to plan the course that it shall entitle them to a portion of the Federal appropriation. That means a college to which perhaps no exact definition has been given, but yet clearly above the grade of a high school or academy.

The law says that the function of the college is "to promote the liberal and practical education of the industrial classes; its leading object to teach such branches of learning as are related to agriculture and the mechanic arts \* \* \* without excluding other scientific and classical studies." Each is under obligation to provide "instruction in agriculture, the mechanic arts, the English language, and the various branches of mathematical, physical, natural, economic science with special reference to their applications to the industries of life." In addition to agriculture and the mechanic arts, the law says specifically that military tactics shall be taught. I am afraid

that there may possibly be some misconception in some quarters as to what this means for I know of no place in the world where the word college as applied to institutions of learning is more of a misnomer than here in Hawaii. The new college should be a college in fact as well as in name. It should ultimately require the completion of a four years' high school course of study as a requisite for admission to its Freshman Class, and then seek to maintain strong four-year courses in agriculture and in the applied sciences. For economy's sake, at least, there should be no duplication of the work done at the people's expense at Lahainaluna or of the courses at Kamehameha or at any of the other schools.

A great many similar colleges in the sparsely settled sections of the West have courses which are hardly better than high school courses, but their excuse is that there are no good high schools from which to draw students. Other colleges have sub-freshman or preparatory departments to meet this difficulty. But with at least two schools of high school grade in Honolulu and others on the way outside, the College of Agriculture and Mechanic Arts, providing it has attractive courses, ought to draw some students who are prepared for their work. I believe, too, that for some time at least the student body will not be so large as to crowd even modest buildings. I trust that numbers will not ever be an inducement for lowering the educational standards.

It has been a noticeable feature of similar colleges in the East that they tend more towards the mechanical and engineering side than towards the development of agriculture. The standards for this work are well established by our Eastern scientific and technical schools. The college can afford only to offer courses that will give the best training. That will probably mean a limited field within which the training shall be adequate and thorough. It is well that the mechanical industries are so closely connected with agriculture. Courses can be planned and carried out that will prepare young men for our main industry, as well as for other mechanical pursuits in the Territory. This means not merely the training of men for a trade, but also the making of skilful, thinking engineers and mechanics.

The main purpose of this college—especially on its agricultural side—is to raise up leaders. This Territory practically has no farms. Before it has farms and profitable products, the principles of agriculture that can be successfully applied to our peculiar local conditions must be studied and applied not solely by the professors in the college and investigators in the experiment stations, but also by farmers in the field who have been trained in the science and who can tell after an experiment why they have succeeded or failed. On the basis of scientific experimentation by the college professors and by

the various scientists in the experiment stations, and with a knowledge of the principles and practice of agriculture and a trained mind for grasping new problems, these students should go out into the fields of Hawaii and demonstrate by actual production and sale of crops, not once or twice but all the time as a means of livelihood, that agriculture is to be an economic factor in the Territory's development.

If the college is going to raise up leaders, it has got to have the material out of which to fashion them and the tools and equipment by which the moulding process may be done. The college can not open its doors to every boy on the street who can neither understand what he is told nor comprehend what he reads in the simplest text book. The students must have training; they must be able to understand and comprehend the instruction; they must be able to apply the principles that they learn to practical problems. It needs no provisions in the Federal statutes, which say that you must have a college with such and such courses or you can not have Uncle Sam's money, to prove that the best interests of the people of the Territory demand that high entrance requirements be imposed and such a course of study planned as will guarantee that students of ability be in the courses—students who will make thoughtful, studious, progressive men. Some one has said that an agricultural college is not to teach boys to hoe, but when and in what soil to hoe.

In discussing educational standards here tonight, happily it is not my duty to outline entrance requirements or to plan the college course. That pleasant task falls on the Regents. That there is great divergence in what shall constitute a proper course is shown by these statistics which I read some little time ago, showing per cent. of courses given in two colleges in the three main groups of studies:

College	Culture	Non. Tech. Scien.	Technical
A	49.9%	24.6%	25.4%
B	8.1	39.3	52.6

In spite of this great diversity of courses, each is a prominent college in States not dissimilar in interests and development. All the other colleges ranged between these two extremes.

At about the same time the Association of American Agricultural Colleges and Experiment Stations adopted the following list as a minimum requirement in general studies:

Mathematics: Algebra, geometry and trigonometry; three years.

Physics and Chemistry: two years.

English Literature and Language: two years.



Other languages: four years.

Mental Science or Logic or Moral Science: one year.

Constitutional Law: one year.

Social, Political or Economic Science: one year.

This does not seem like an exorbitant requirement. This would constitute about two-fifths of the work, the other three-fifths being technical scientific subjects.

And as a minimum for entrance requirements, they united on

1. Physical geography;
2. U. S. history;
3. Arithmetic;
4. Algebra to Quadratics;
5. English grammar, composition and literature.

Except in English literature, our Punahou Freshman would have much more than this requirement.

Of course, the better colleges did much more than this. But this shows that the new college in Hawaii can and must start with a standard no lower than that, and if it is a good deal higher, it will more nearly meet the peculiar conditions here in the Territory.

This Territory needs first a body of agricultural science after which will come a genuinely scientific agriculture. Through the experiment stations—Federal, Territorial and private—a considerable agricultural science has been developed. The results of these years of actual study and experimentation should be available for the new college. They are, of course, generally to be had for the asking; but I believe that they should be brought into direct and specific use by having the scientific men of the station either personally connected with the staff of the college, giving a part of their time to the instruction in the college or in some less direct way affiliated with the new institution. The valuable knowledge of soils and products, of crops that may and may not be grown profitably, of proper methods of cultivation, and of all the details which these stations have been accumulating for years through experiment and trials should be quickly and thoroughly put to use in training the incoming generation of agriculturists. The investigator in the stations might very well be a teacher in the college. While the work in each should be distinct, the two can well coöperate.

The college must have such a judicious combination of the so-called literary subjects with the scientific and technical subjects and must give such a good, genuine broad education in these subjects as will make not men who have received just enough knowledge to become dangerous, but men who will make the industrial pursuits worthy callings for educated men and who will bring blessings to this community by increasing its resources and profitable products.

## WHAT THE COLLEGE CAN DO FOR HAWAII.

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*By Walter G. Smith, Editor Pacific Commercial Advertiser, Regent of the College of Agriculture.*

It is a very general feeling that the new College of Agriculture should do whatever, within its legal scope, will help Hawaii most. That duty seems to be to encourage, stimulate and bring about, the diversification of our farm industries. Sugar is quite able to look after itself. It has its own scientific laboratories, its own experimental farms, its large staff of trained men, its fine record of achievement. It does not seek or require the scientific aid of the college about to be founded. But tropical farming does need such aid. It asks the help of young men trained to find the right soil for the right crop, to protect that crop from pests, to improve the quality of the product and the magnitude of the yield. If Hawaii can train enough young men to this service then it may regard its future with satisfaction. Idle acres will eventually be turned into good farms. All our industrial eggs will not be carried in one basket. Prosperity, now the privilege of the few, will become the happiness of the many. The Territory will be in shape to get the substantial middle class it needs to "develop along typical American lines." It is a fair question: Could the new college have a more useful mission than this? Is there any worthier work for it to do?

The dream of a Hawaii of farms and homes is not an illusive one. There is nothing in frost and ice and rugged soil and angry skies to guarantee a success in agriculture which is denied to sunshine and rain, fertile volcanic earth and temperate breezes. People who go into farming for staples and make money in competition with millions of others have no reason to fear the results when they go into farming for luxuries, which everybody wants and but few produce. Instead of being a place to avoid in agriculture, Hawaii is a place to seek. Sugar uses but 200,000 acres out of a total area, good and bad land, of 4,250,000 acres; and there is room for a multitude of people to grow other things than sugar. To help them do it would appear to be the best and highest object of the College of Agriculture.

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## THE RELATION OF SECONDARY EDUCATION TO THE AGRICULTURAL COLLEGE.

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*By Perley L. Horne, Principal Kamehameha Schools.*

Secondary schools usually include schools below the college and above the intermediate and low grammar. In Honolulu, secondary schools would naturally include Oahu College, the

High School, the Normal and the upper classes of Kamehameha. The last named school, while below the grade of the others in strictly college preparatory work, is equal to them and perhaps ahead in scientific and mechanical work. In mechanical and freehand drawing, in nature study, in domestic science, in the scientific study of chemistry and physics in relation to daily life, in scientific agriculture, and in shop work of all kinds, Kamehameha will easily bear the test. In purely academic work, she must be content to rank below the others.

But for the purposes of this paper, I think that I may rightly include Kamehameha in the list of schools whose students will rightly claim the advantage of the new agricultural college.

The presence of such a college in our midst will necessarily bring changes in the course of study in all these schools, to prepare young men and young women better to take up the advanced work of the college. The new college is to be something more than a farm: and its students are to be something more than tillers of the soil. The secondary schools are to be the natural feeders of this college. To do this well, new courses of study will need to be developed in the secondary schools along scientific and agricultural lines. More nature study work, preliminary courses in agriculture, domestic science, manual training and allied subjects must be more fully developed.

To do the best work, the college must receive into its regular courses students who have some elementary knowledge of these subjects. Preparation of this nature will be as valuable as work in classics, advanced mathematics or modern languages, admirable as these latter are.

The elementary work the college ought not to be expected to do. However, this paper does not have to deal so much with what the college is to be or do as with what the secondary school should be to help best the college. This I believe the college will help determine.

I believe fully in industrial education in the secondary schools; the training of the hand as well as the head and heart. By industrial training, I do not mean alone shop work, but scientific study of every kind, also agriculture in its various departments, and practical and social and civic problems. Each secondary school should have its beginning courses in gardening, horticulture, forestry, agriculture, as well as in arithmetic and history, not only to interest the young in these vital phases of life, but to arouse their love of all that pertains to the plant and animal life of our universe. A school of advanced study in such subjects would of a right expect elementary work along such lines in the schools that naturally supplied students to it.

Special requirements for admission must be met. To read, to write and to cipher, will not be enough. The college will have a right to expect its young men and young women to have a fair training in the common English branches, and to have some knowledge of plant life, of insect life, helpful and harmful, of the elements of the soil, of gardening, a fair knowledge of the fruits and trees of their home land. This knowledge to be universal in the Territory cannot be left for the home to impart, but must be given by the schools. These questions are of as great educational value as any subject studied and of far greater practical value than many subjects taught. The presence of the college will be a great stimulus to all scientific study in our secondary schools. So soon as the general requirements for admission are laid down by the Regents and the new faculty, at once the duty of all the secondary schools will be to furnish courses of study to meet these requirements so that the young people of our Territory may speedily avail themselves of the fine opportunity the new college will offer.

And yet the doors of the college ought not to be closed to those whose privileges have been restricted and who are mature students, to avail themselves of certain lines of research in special work made possible by the college. Here the college can offer a splendid opportunity for special students. Young men and young women who wish to pursue some special line of research, but whose academic preparation does not fill the general educational requirements for admission should have the privilege of entering to study their special field. For instance, a young man may wish to study chemistry, to prepare himself to be a chemist upon a plantation, or in the fertilizing works. Given a fair general education, a mind capable of grasping the subject wished, and a purpose to do the work he wishes, the student should receive every encouragement that he may get the start he seeks. Or if some one wished to study dairying or poultry-raising, veterinary, or bacteriology, the chance should be given if certain conditions are met.

But I wish especially to emphasize one phase of the general question. The new college cannot afford to set its requirements too low. Better to begin with five pupils well prepared, and keep the standard high than to begin with twenty-five at a low entrance standard. I think it behooves the Board of Regents to give a very clear statement of the requirements for admission as regular students and the minimum requirement for special work, and the college will do well to emphasize the regular course and to discourage special course, although there will always be a demand for the latter which should be met. The ideal can not be too high. To start with a high standard is easier than to raise that standard. And

yet the full requirements need not be met the first year, although no diploma should be granted unless the full standard is maintained in all the branches of work required for graduation.

Let me present a tentative program for admission as a basis for argument, and in this rating my plan has been to follow somewhat those adopted by the better class of colleges on the mainland, differing in details to meet local conditions.

I recommend that thirty-five points be required for admission as a regular student. That the following subjects rated as indicated, twenty-seven points be required of all regular students and that subjects aggregating eight points be required elected from other subjects:

#### SUBJECTS REQUIRED FOR ADMISSION.

	Points
English . . . . .	6
History of Hawaii . . . . .	1
History of the United States . . . . .	2
Arithmetic including the metric system . . . . .	2
Algebra through quadratics . . . . .	3
Plane geometry . . . . .	3
Island nature study (a three years' course) . . . . .	4
Elementary physics . . . . .	3
Elementary chemistry . . . . .	3

#### ELECTIVE SUBJECTS FROM WHICH 8 POINTS ARE TO BE CHOSEN.

	Years	Points
Latin . . . . .	3	4
Elementary French . . . . .	2	2
Elementary German . . . . .	2	2
Advanced German . . . . .	1	2
Advanced French . . . . .	1	2
Advanced Algebra . . . . .	1	1
Solid Geometry . . . . .	1	1
Trigonometry . . . . .	1	1
Advanced Physics . . . . .	1	1
Advanced Chemistry . . . . .	1	1
English History . . . . .		2
Oriental History . . . . .		2
General History . . . . .		2
Freehand Drawing . . . . .		2
Mechanical Drawing . . . . .		2
Architectural Drawing . . . . .		2
Projections . . . . .		2
General Knowledge of Hawaiian, Japanese, Chinese, Portuguese and Spanish, each . . .		2

	Years	Points
Special knowledge of same, each..... ..		2
Bookkeeping . . . . .		2
Stenography . . . . .		2
Commercial Law and Business Forms..... ..		2
Carpentry . . . . .		2
Wood-working . . . . .		2
Machine tool work . . . . .		2
Blacksmithing . . . . .		2
Chipping, filing, fitting . . . . .		2
Electricity . . . . .		2
Harmony . . . . .		2
Counterpoint . . . . .		2
Civil Government . . . . .		2
Economics . . . . .		2
Physiography . . . . .		1
Botany . . . . .		1
Zoology . . . . .		1
Astronomy . . . . .		1
Anatomy, Physiology, Hygiene . . . . .		2
Meteorology . . . . .		2

This wide range of subjects would allow great freedom in preparation.

I recommend that the 35 points indicated be required of the entering classes in 1907-1908, 1909: that in 1910, the required number be 37 points, i. e. 10 electives; in 1911, 39 points, and in 1912 and thereafter 41 points or 14 points for the elective list.

I recommend that the requirements in each subject designated be explicitly stated by the faculty of the college, so that each preparatory or secondary school may know exactly what will be required in each subject.

I recommend that no student be allowed to enter as a regular who shall fail in ten points, that no student be allowed to graduate from such college until he shall have completed the regular prescribed course of the college and have passed off all entrance conditions or completed an amount of extra work in the college to offset conditions.

I recommend that specially approved candidates who pass 15 points be allowed to enter the college as special students to pursue such course or courses of study as the faculty may approve. The terms of their certificates from the college would naturally be determined by that body.

I recommend that graduates of Oahu College, the Honolulu High School and the Hilo High School be entered on certificate, credit being given only for the points definitely stated by the president or principal of these institutions: that graduates of Kamehameha and Lahainaluna be given credit in

such subjects as the president or principal may recommend, and in no other subjects: that all other candidates be required to pass the entrance examinations.

I recommend that credit be given any candidate presenting certificate from the College Entrance Examination Board in those subjects in which he or she has been examined and passed and in no other.

I recommend that the certificate privilege be taken away at any time from any institutions whose pupils may continue to prove incapable of carrying on the work of the college.

I have presented at some length this tentative schedule. It embraces many subjects, but no more than are presented by our best institutions on the mainland. Some of these subjects may be omitted: others may be added. Different rating of many of the subjects might be made. I present the list with the ratings as a basis for further consideration.

Given a schedule like the one outlined or any other as explicit, the various schools of the Territory would know what to do and would at once fashion their courses of study to meet the requirements. Perhaps the requirement for admission as outlined may seem too hard. But with provisions made for special students I do not believe them excessive, and I do believe that the new college will more quickly get results by setting at the start a high standard and increasing this as time goes on until it will be second to none.

The secondary schools will meet the standard set by the college. If that standard is low, the standard of our public schools will decline, for I hold it almost an axiom, that the highest public institution in any State or Territory will shape the standard of all the secondary schools to meet its requirements. We have the right to demand of this new institution that it rank with the best. The number of students at the start may be small, but that matters not. The ultimate good of the whole Territory should determine the policy. And to my mind the standard of admission needs to be high, that results may be obtained. A slipshod beginning with low entrance requirements and a snap course, accommodating all who wish to enter, will make the college unworthy the name and will turn out young men and young women with a thin veneer of information that will not bear the test of the hard-headed, horse sense business world of today.

If the list of subjects presented seem altogether too long and too varied, particularly the elective course, consider this: The mere mention of these courses on the list of requirements would indicate to the secondary schools the immense range of subjects that can be taught in our secondary schools. No school could begin to teach all. All schools could teach some and probably more than they now do. The day is past that the school schedule follows absolute and fixed lines. Local

conditions determine and rightly many of the elective courses in schools. A study of the Japanese beetle in the public schools of Hawaii would be a help to the Territory, in Massachusetts, the time spent would be ill-advised. In Massachusetts many of the public schools study the gypsy moth and the potato bug. The study of these insects in Hawaii would not bring results. The same is true of rice culture in New England, no benefit would come, proportioned to the time. In Hawaii the reverse is true.

A schedule of possible subjects to be offered for admission to the Agricultural College, and these subjects well-defined, would act as an inspiration to the public school and would induce a course of reading in the home that would rarely be considered without the impetus of a schedule of possible requirements.

With this final suggestion, I am through. The secondary schools of the Territory have a right to demand that their standard be raised by every possible means. A low grade college will lower the standard. A high grade college will raise the standard and increase the efficiency of our secondary schools, and as the capstone, such a college will grow into a Territorial University, whose graduates will revolutionize the agricultural and industrial life of Hawaii nei.

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### *WHAT SHOULD THE COLLEGE OF AGRICULTURE MEAN TO THE AGRICULTURIST?*

*By Mr. Byron O. Clark.*

The modern agricultural college is the outgrowth of a condition brought about by the wasteful, ignorant methods of soil tillers of generations past.

The day when a worn out farm could be abandoned, and one of virgin fertility obtained farther West for the asking, soon passed; and the agriculturists found themselves face to face with a problem; the worn out soil must be rejuvenated, or they must change their occupation.

True to the American instinct when aroused by necessity, they set about investigating and experimenting; the deeper they went into the subject the more important it grew; and it was necessary to appeal to science through men who, although not practical soil tillers, could give from the scientific standpoint of the chemist, some knowledge of the relations of the various soil elements to each other; how each had its affinity for some other element which, on becoming exhausted from the soil, not only left it deficient in that element, but also made its affinitive element unavailable as plant food.



Often on suggesting the addition of one simple element to the soil, it would grow certain crops to the perfection of olden times. At other times, with other crops, the results were not so satisfactory, and it was in time found that the wisdom of the chemist could not always unlock nature's secrets; this led to coöperative experiments between the tiller of the soil, and the man in the laboratory. Thus from a small beginning arose the necessity for specialized scientific investigation; a fact quickly recognized by some of our colleges, and to a limited extent by the farmers.

The demand for this broader education by our farmers, met with munificent provisions for agricultural colleges by the Federal Government and has grown to such an extent that most of our States and Territories now have well equipped colleges; but I am sorry to say that in some instances, sufficient prominence has not been given to the agricultural features in the truest sense, and in other instances, the farmers have been slow to recognize the importance of the training to be obtained at these institutions by their children.

The founding of such an institution as the proposed Agricultural College of Hawaii, should be one of the most marked forward movements in the development of diversified agriculture in these Islands, that has ever been taken. On account of our unique location, I predict that it will become, within the life time of most of its first Board of Regents, one of the important agricultural institutions of the United States; when students from the mainland and from foreign countries will be interested, seeking to enter its portals.

There never has been a time when tropical agriculture attracted so much attention as at present. We have here a virgin field for investigation, with ideal climatic and other conditions for founding an institution for the study of all that pertains to tropical agriculture. There is no place in the world so well suited for the work which we should take up, as Honolulu.

It should be the aim of this institution to equip our young men and women with a practical, scientific education that will enable them to go upon our hill sides and plains and make them produce to the highest perfection, the various tropical fruits and other products for which these Islands will surely become noted; they should not only be taught the theory of agriculture in all its branches, but they must learn the practical application of the knowledge gained for the benefit of their vocation.

Above all they should be taught the honor, glory and dignity of being able to win a competency from the soil, under adverse, as well as favorable conditions; they should be able to look back in their mature years and say, "I owe whatever success I have attained in my calling to the instruction and

experience received at my Alma Mater—the College of Agriculture of Hawaii.”

This institution should be of greater significance to agriculture than to any other industry of Hawaii; it should *mean* more to the soil tiller than any institution to be established here. We are distinctively an agricultural community; excepting sugar we have no well established agriculture in any of its branches; the possibilities are not dreamed of by the most enthusiastic advocates of diversified industries.

This college means that our young people will be taught how to unlock unknown riches now lying dormant in our virgin soil, making it productive, and greatly adding to the wealth of the country; at the same time beautifying hillside and valley with fruiting tree and vine, blooming plants and waving pastures of succulent forage, such as is not deemed possible today, because of our lack of knowledge, and the faith which only comes through knowledge.

The higher education along specialized lines, made possible by this institution, will bring about this transformation. All this, and more is what the College of Agriculture will mean to Hawaii.

#### *HOME MAKING AND THE ART OF RIGHT LIVING AS INFLUENCED BY THE COLLEGE OF AGRICULTURE.*

*By Miss Minnie Reed, Science Teacher Kamehameha Manual  
School.*

Among the earliest of land grant colleges to be established were the Michigan and Kansas Agricultural Colleges. For twenty-five or thirty years they have led all others in the quality of their work and in their influence upon the citizens of their State.

They have not been fused with their State universities, so have kept their individuality and done their own special work well. They have laid their foundations on broad, generous lines, and have developed fine, strong men and women from the young boys and girls sent to their halls. Sometimes these boys and girls come from very crude homes and from untrained or illiterate parents, but not always; for many students come from cultured homes, either from ranch, farm, village or city. Most of these boys and girls are young, from fourteen to eighteen, and usually they are very much in earnest and anxious to gain the practical training offered.

I know most about the Kansas Agricultural College, so shall tell something about the work it has done and is doing for the homes of the commonwealth. Other agricultural colleges are doing similar work in other States, but no State has as

well-equipped, well-organized domestic science department as Kansas.

President George T. Fairchild, brother of the famous Oberlin president, wisely directed the affairs of the Kansas Agricultural College for nearly twenty years and laid the foundation on broad, practical lines. He was one of the earliest advocates of the laboratory, manual or technical training, along with the scientific and English work, in agricultural colleges. After much opposition and against many obstacles, he demonstrated the advantages of such training for the students under his care. He always said, "We learn best by doing; so we must have adequate laboratories for the sciences and shops for the manual and technical training." He often said, "Our students are young enough to graduate here; then go to the university for the higher training; for we train the head and hand together." He believed this so thoroughly that he sent his three sons to the agricultural college for their preliminary training, before he sent them on to an Eastern college to take professional studies.

Very early in the history of this college, domestic science was put into the curriculum for the girls, on the same basis as the practical agriculture for the boys; and no boy could graduate without the agriculture, and no girl without the domestic science.

The boys have five hours per week of actual practical farm work in fields, gardens, orchards and in caring for the farm animals; besides class-room lessons and lectures upon agriculture, soils, etc. The girls beginning with the first year have five hours weekly devoted to plain sewing, dressmaking, embroidering, etc., besides lectures on economic and hygienic clothing for women and children. The second year is devoted to cooking all kinds of foods from the plain bread and beef-steak to pies, cakes, puff-paste and French candies. Serving a meal daintily and artistically is also a part of the actual laboratory training; for there is not only a kitchen and range, but a china closet and a dining room, where breakfasts, lunches and dinners are actually served by the girls, who have to act as hostess when the governor and regents, faculty or less august friends visit the college.

Besides this, the girls are taught how to cook for invalids and children, and study the proper balanced ration for the brain worker, day laborer or athlete; and the chemistry of all the staple foods and their relative digestibility.

Fruit canning, the making of jellies, jams, preserves and pickles is put in the last year, along with marketing, for those girls who take domestic science for their major subject.

It is needless to say that many a girl specializes in domestic science, especially if during the four years' study she has considered the proffered partnership of some young farmer and

expects to preside over their home. The young men and women meet freely in class-room and social affairs of the college, and many life-long attachments are formed before graduation. There are also special courses in horticulture and home flower gardening offered to any girl who chooses them, and very many choose to spend two hours per week during their senior year in learning how to raise various kinds of house or garden plants. Under the direction of a genial old Scotch gardener these two hours are a delightful recreation, whether it be in the conservatory or out in the spring sunshine planting seeds or pansies and roses. Every girl also has special lectures in personal hygiene, in the care of a family, in household sanitation, decoration and furnishing; besides, vocal and instrumental music, drawing, designing, etc., are offered to any who choose.

Perhaps you wonder how they find time during these four years for any academic work. All who wish to go to the university must prepare their Latin under a tutor outside of college. The general scientific course requires enough mathematics, science, German and English for entrance into the scientific course of the university; besides the domestic science and agriculture, economics, psychology, etc.

The special courses, as the domestic science course, the agricultural, mechanical and electrical engineering, or other courses, do not give so broad a training, as the specialization begins earlier.

The college also offers short summer courses for teachers and winter courses for farmers or those who can not hope to graduate. These courses include domestic science, drawing, physical culture, floriculture, dressmaking, bacteriology, dairying, crop production, botany, horticulture and various agricultural subjects.

Farmers' institutes are conducted throughout the State by the professors from the college. These are supported in every community by the progressive farmers and their wives, many of the leaders having been trained at the college.

Many of the Kansas farmers are from the best class of New England, so are an intelligent and thrifty class of people. These, of course, receive the most benefit from these institutes and from contact with the men and women who are trained in college.

However, the illiterate foreigners who have settled on the farms are gaining much good from the lectures and demonstrations given at these institutes and from the farmers who have been trained in college. These college-trained farmers and their wives are a great leaven in every community and are leading their foreign neighbors to send their children to college and to improve their homes and raise their standard of living.

What are the results of this training upon the homes and the agricultural interests of the State of Kansas?

First—It has made more efficient and prosperous farmers, hence has increased the value of land and of crops many times over.

Second—It has developed a love for country life not known to uneducated farmers.

Third—It has added to the beauty and comfort of farmers' homes, as many of the farmers' wives have the training that makes them helpful comrades for their husbands and children, as well as good housekeepers.

Fourth—It has improved the community life, for the love for books, music and art gained at college has interested them in libraries and lectures, and in better music and pictures, while enough of the social graces have been acquired to enable them to meet people easily and freely.

Fifth—It has interested them in civic affairs, for all have had some training in sociology and political economy. The farmers of Kansas are alive to social questions and political interests of their State and the Nation. Nothing could illustrate this better than the recent fight with the Standard Oil monopoly. It was the intelligent interest of the farmers of Kansas that made that fight possible and successful.

Sixth—It has greatly improved the rural schools, both in raising the standard for the teachers, in better buildings, more attractive school grounds, and better equipment and furnishings for the schoolhouse.

Seventh—It has resulted in happier homes, in healthier families, stronger, better-nourished and better-trained children; because the farmers' wives have more to make their lives interesting and are better poised and are more intelligent. And yet this is not all, for the Kansas College of Agriculture, for one, has further made good, it may be stated, in that fifty important positions in our National Department of Agriculture are held by its graduates, and as many more are teachers of agriculture in State colleges, and many more are numbered among the State's honored citizens—professional men and women, merchants, and advanced practical agriculturists.

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### *A UNIQUE OPPORTUNITY FOR THE COLLEGE OF AGRICULTURE OF HAWAII.*

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*By J. E. Higgins, Horticulturist Hawaii Experiment Station.*

The natural function of an agricultural college is not primarily research, but instruction. It does not discover, but *teaches* truth. It should take the results of the work of investi-

gators and place it in the possession of the people. This it does chiefly through the young as in all branches of education, but those of the middle aged and the old, who are yet young in spirit should profit much by its teaching.

Until a very few years ago practically all the work of research in agriculture had been done in the temperate zone. It is true that there had been botanic gardens in tropical countries, where collections of tropical plants had been cultivated, but experiment stations or other institutions for the study of the laws of agriculture in the tropics or of the application of known laws to tropical conditions are of the most recent advent. Naturally enough, however, these stations have preceded the institutions for higher agricultural education. The unique opportunity has presented itself to the people of Hawaii to establish the college of tropical agriculture of America. There is today no college on American soil so located and equipped as to supply the needs of the American student seeking instruction of a high grade in tropical agriculture. The need of such an institution is apparent in view of the tropical areas which have recently been added to the domain of the United States. The Philippines, Hawaii and Porto Rico will call for a large force of young men trained in tropical agriculture. A few years ago there were those who prophesied that there would be an over-production of graduates from the colleges of agriculture on the mainland. As the number has grown the demand has increased, and there are today more openings for the hundreds than there were a few years ago for the tens. These young men are demanded not only by institutions for research and instruction, but by private employers in many capacities. The man of wealth with large country estates seeks a manager at the agricultural college or among its men already in the field. Further, the young man of today who intends engaging in agriculture as a private business, if he is alive to his opportunities, avails himself of the advantages afforded by one of the agricultural colleges.

As progress is made in the development of the agricultural resources of Hawaii and other American tropical territory there will be an increasing demand for young men trained in tropical agriculture. I know of a young man who recently received an offer as a plant breeder in the tropics. The offer came from a business corporation, and the remuneration would have been in the neighborhood of \$5,000 per year at the start. This single field of plant breeding will occupy the attention of large numbers of young men in the future, and no field is more promising or will be more prolific in results than the tropics. Little has been done to improve tropical plants and with the exception of a few species, there has been practically no plant breeding. The work of Burbank, which has justly attracted so much attention will be repeated in

many spheres of plant life. Mr. Burbank is a pioneer. By his careful study of plants and the laws which govern the plant breeder and by his never-failing patience, he has accomplished results which seem astounding, but the future will present far more astonishing achievements. Where can the young man who wishes to enter this or other fields of tropical agriculture find a college training adapted to his needs? The College of Agriculture of Hawaii should be prepared to fully equip him for his work. While we cannot overlook the work of preparing young men for agriculture as a business, the College of Agriculture will, in my opinion, fall short of its high opportunity if it fails to give a strong and liberal education to its advanced students, so that they will be prepared to occupy positions of importance and large usefulness in this or other lands. This teaching of the science of agriculture need not in any way interfere with the instruction in the art of agriculture.

There may be those who cannot see where our student body is to be derived from for this high class of work. The college will create a demand for agricultural education and for educated agriculturists. As the students of Oahu College, the High School, Kamehameha, and the other preparatory schools of the Islands become aware of the opportunities for students in agriculture, and of the fact that to acquire an agricultural education at the college, requires little in money but much in perseverance and work there will be many of the ablest among them who will seek its open doors. There are young men today in our agricultural colleges of the mainland who are looking towards the tropics as the field for their future work. They are endeavoring to study tropical agriculture with frozen soil and snow-covered fields. To get such young men in the College of Hawaii would result in bringing to this country many an enterprising young man, who would remain and who by his financial and mental resources, would do much for the development of the Territory. Many another who here gained his knowledge of tropical agriculture would in distant lands do valuable promotion work for the agriculture of Hawaii, and would doubtless send us many a settler. Since it is confidently expected, a very large part of the financial support of the college will be from the United States treasury, it is only fitting that the institution should have something of a national character.

It will be felt by some that this is too high and too large a work for a college of resources so limited as those of the College of Agriculture of Hawaii. I believe, however, that small means need not prevent this work being carried out. There is in Hawaii today a body of specialists in many branches of tropical agriculture and who are, I believe, sufficiently interested in the development of Hawaii and its agricultural re-

sources to give a limited portion of their time to lecturing in the college, uninfluenced by financial considerations. A large part of the staff could be supplied by the same method as is now in vogue in many of the strongest medical colleges wherein physicians devote a certain portion of their time to college lectures. Frequently the services of the ablest medical men could only be secured in this way. If a course of advanced lectures in forestry, rubber cultivation, soils and soil management, tropical entomology, plant pathology, and the like could be given by the specialists in these lines who are already in the Territory, the College of Agriculture of Hawaii could offer to its students a course so strong as to compare favorably with any of the colleges of the mainland in its special sphere. An occasional lecture could also be provided by some one who has made a success in the business of agriculture from a commercial standpoint. This practice is being carried out by colleges on the mainland, and has its valuable features. It draws the farmer into closer contact with the college, and the college into closer sympathy with the work of the farmer. The students gain much inspiration as well as valuable information from a talk by one who has succeeded in the growing of pineapples or some other crop.

In this way it would be possible to build up on small resources a very able college of tropical agriculture, unique in its sphere among American agricultural colleges, equal in its standard to any of them, and which would be a powerful force in the molding of the future of agricultural industries in Hawaii.

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*SYLLABUS OF A FOUR YEARS' COURSE IN AGRICULTURE BASED UPON THE SEVERAL REPORTS OF THE COMMITTEE ON METHODS OF TEACHING AGRICULTURE OF THE ASSOCIATION OF AMERICAN AGRICULTURAL COLLEGES AND EXPERIMENT STATIONS.<sup>1</sup>*

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*(Compiled by F. G. Krauss.<sup>2</sup>)*

General subjects essential to a four years' course in agriculture leading to the degree of Bachelor of Science:

	Hours.
Algebra . . . . .	75
Geometry . . . . .	40

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<sup>1</sup> Committee of the Association of American Agricultural Colleges and Experiment Stations. See Reports U. S. Dept. of Agri., Office of Experiment Stations, Buls. 41, p. 57; 49, p. 29; 65, p. 79; 76, p. 39, and Bul. No. 127; and Circ's. 32, 37, 39, 41, and 45.

<sup>2</sup> With slight alterations to adapt same to Hawaiian crops.



Trigonometry . . . . .	40
Physics (class-room work) . . . . .	75
Physics (laboratory work) . . . . .	75
Chemistry (class-room work) . . . . .	75
Chemistry (laboratory work) . . . . .	75
English . . . . .	200
Modern languages . . . . .	340
Psychology . . . . .	60
Ethics or logic . . . . .	40
Political economy . . . . .	60
General history . . . . .	80
Constitutional law . . . . .	50
<b>Total . . . . .</b>	<b>1285</b>

The total number of hours included in a four-years' course, allowing fifteen hours per week for thirty-six weeks, would be 2,140; with ten hours' laboratory work, or practicums, added, 3,600. In general terms, therefore, the foregoing general studies should comprise about two-fifths of the work required for a bachelor's degree in agriculture.

The committee on methods of teaching agriculture suggests additional subjects to be included in a four-years' course in agriculture leading to the degree of bachelor of science, as follows:

	Hours.
Agriculture . . . . .	486
Horticulture and forestry . . . . .	180
Veterinary science, including anatomy . . . . .	180
Agricultural chemistry, in addition to general requirement . . . . .	180
Botany (including vegetable physiology and pathology) . . . . .	180
Zoology (including entomology) . . . . .	120
Physiology . . . . .	180
Geology . . . . .	120
Meteorology . . . . .	60
Drawing . . . . .	60
<b>Total . . . . .</b>	<b>1746</b>

In reckoning the number of hours, two hours of laboratory work, or practicums, are considered the equivalent of one hour of recitation. In this way the total number of hours in a four-years' course is made 2,900, instead of 3,600.

Taking up the subject of "Agriculture" designated above, the committee recommends that agriculture (486 hours) shall include and be divided into:

	Hours.
1. Agronomy, or plant production.....	132
2. Zootechny, or animal industry.....	162
3. Agrotechny, or agricultural technology.....	72
4. Rural engineering, or farm mechanics.....	60
5. Rural economics, or farm management.....	60
	<hr/> 486

#### SYNOPSIS OF COURSE IN AGRICULTURE.

Agronomy, 132 hours.—Climate, soils, tillage, drainage and irrigation; fertilizers, plant production, farm crops.

Zootechny, 162 hours.—Principles of breeding, breeds of live stock, stock, feeding, care and management. (Animal physiology to be taught under physiology; anatomy and animal diseases, under veterinary science.)

Agrotechny, 72 hours.—Butter making, cheese making. (Other topics, such as sugar making, wine, or olive oil making, may be taught under this head in different parts of the United States.)

Rural Engineering, 60 hours.—Roads, drains, irrigation systems, farm buildings, and machinery.

Rural Economics, 60 hours.—History of agriculture, farm management, rural law, farm accounts.

#### EQUIPMENT FOR COURSE IN AGRICULTURE.

The following brief statements may serve to show in a general way the equipment required in connection with the instruction given in a four-years' course in agriculture:

##### **Agronomy.**

Field trials of various crops for class demonstration.

Laboratory (including glass house) for work in soil physics, not experiments, etc. This laboratory should have a floor space of from 1,000 to 2,000 square feet.

Collection of soils, fertilizers, plants, etc., for class illustration.

Photographs, lantern slides, charts, diagrams.

Books of reference.

##### **Zootechny.**

Live stock of different types and breeds.

Lecture room, arranged for exhibiting live animals to class and equipped with instruments of precision for weighing and measuring.

Collections: models, mounted specimens of animals, specimens of foods, etc.

Lantern slides, photographs, charts, etc.

Reference books, especially herdbooks and stock registers.  
(There should be a seminary room for the use of these books.)

### **Agrotechny.**

Dairy laboratory (this should include the following rooms, which may cover some 6,000 feet of floor space): Butter-making room, cheese-making room, cheese-curing room, pasteurizing room, receiving room, store room, refrigerating room, boiler and engine room. These rooms should be equipped with all modern apparatus for testing and pasteurizing milk and making butter and cheese.

### **Rural Engineering.**

College farm should illustrate various problems in farm engineering, such as roads, drainage, and irrigation.

Laboratory, equipped with apparatus for illustrating various mechanical problems in farm machinery.

Collections: tools and farm machinery.

Lantern slides, charts, and diagrams.

Reference books.

### **Rural Economics.**

Reference books.

## *BOARD OF AGRICULTURE AND FORESTRY.*

### **REORGANIZATION OF COMMITTEES.**

At the meeting of the Board of Commissioners of Agriculture and Forestry, held on April 17th, Mr. W. M. Giffard, the President of the Board made announcement that certain of the Committees of the Board had been reorganized, on account of the resignation of former members of the Board and the appointment of new men. The list of Committees as they now stand is as follows:

Forestry—Messrs. A. W. Carter, W. M. Giffard and P. R. Isenberg.

Entomology—Messrs. W. M. Giffard and G. P. Wilder.

Finance—Messrs. C. S. Holloway and W. M. Giffard.

Rules and Regulations—Messrs. A. W. Carter and C. S. Holloway.

Agriculture—Messrs. G. P. Wilder, L. G. Kellogg and P. R. Isenberg.

Animal Industry—Messrs. A. W. Carter, P. R. Isenberg and L. G. Kellogg.

## PRESIDENT PRO TEMPORE.

To insure that the Board of Agriculture and Forestry shall never be left without an Executive Officer, the Governor has ruled that on leaving the Territory the person holding the office must resign. Accordingly, during the absence of Mr. W. M. Giffard on a three months' trip to the mainland, Mr. C. S. Holloway has been appointed as President and Executive Officer. Mr. Holloway's appointment took effect on the day of Mr. Giffard's departure, May 22, 1907.

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 DIVISION OF FORESTRY.
 

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## ROUTINE REPORTS.

April 17, 1907.

Board of Commissioners of Agriculture & Forestry, Honolulu.

Gentlemen:—I have the honor to submit the following report, covering the routine work of the Division of Forestry, from April 3rd to date.

During the fortnight, I have been continuously in Honolulu engaged with the routine work of the Division and with the preparation of two reports on forest reserve projects. These will be submitted to the Committee on Forestry within a few days.

Since my last report Mr. Haughs has completed the planting plan for the Catholic Mission lands in Kalihi valley. A copy of the plan has been handed to Father Adelbert Rielander.

An application for a forest planting plan has been received from the Wahiawa Water Company. Mr. Haughs will visit Wahiawa this week to make the necessary examination on the ground.

Mr. Haughs has also made several trips up Nuuanu Valley to oversee certain work in transplanting trees and shrubs on the Atherton property made necessary by the construction of a new pipe from the Nuuanu dam.

I regret to report that House Bill No. 177, an Act introduced by Hon. Wm. J. Sheldon, to provide for the better protection of forest trees against trespass, was killed in the House.

A limited number of Farmers' Bulletins consisting of a series of about a dozen numbers has been received from the Delegate to Congress, and distributed to the principals of the larger public schools. There yet remains on hand some of

the congressional vegetable seed. This may be had upon application to the Mailing Clerk.

The library room of the Board was used for meetings during the past fortnight, as follows:

Hawaiian Entomological Society, April 4th.

Hawaiian Poultry Association, April 9th.

Very respectfully,

RALPH S. HOSMER,

Superintendent of Forestry.

April 30, 1907.

Board of Commissioners of Agriculture and Forestry,  
Honolulu.

Gentlemen:—I have the honor to submit the following report covering the work of the Division of Forestry from April 17 to date.

During this fortnight I have been in Honolulu occupied with the completion of reports on a proposed forest reserve on the Island of Kauai and on the addition of certain government lands to the "area actually reserved" in the Koolau (Maui) and the Hana Forest Reserves. The remainder of the time has been taken up with attention to various details connected with the regular work of the Division.

On Thursday, April 18th, Mr. Haughs visited Wahiawa and completed the field work necessary for the preparation of a planting plan for the Wahiawa Water Company.

A collection of exotic seed has recently been sent out to thirteen volunteer observers who have consented to plant the seed and later set out the trees.

On Tuesday, April 23, Mr. Haughs moved into the cottage in the nursery grounds which has recently been put into repair. This will enable him to exercise continuous supervision over the grounds, a care which since Mr. Austin's resignation has not been exercised.

The library room of the Board was used for a meeting of the Honolulu Improvement Advisory Board on Tuesday, April 23.

Very respectfully,

RALPH S. HOSMER,

Superintendent of Forestry.

*Report of the Forest Nurseryman.*

In a report to the Superintendent of Forestry dated April 30, Mr. David Haughs, the Forest Nurseryman, after mentioning his trip to Wahiawa, says:

"An order has been received from Mr. C. A. Brown, manager of the Ii Estate, for ten thousand trees to be planted on a tract of land examined by the writer on November 28th, 1906. The trees are to be ready by September and planted according to recommendations made at the time of examination.

*Collection and Distribution of Seeds.*

"The collecting of seed for sale and exchange purposes has been continued and a large variety of seed is now in stock.

"Packages of tree and other seeds are arriving by every mail, from those who have received seed from us.

"Exotic seed has been distributed locally as follows:

"W. D. McBryde Esq., Rev. Hans Isenberg, G. N. Wilcox, Kauai.

"L. von Tempsky, Esq., H. A. Baldwin, Esq., Maui.

"James Munro, Esq., Molokai Ranch, Molokai.

"A. W. Carter, Esq., Parker Ranch, R. von L. Domkowicz, Esq., W. H. Shipman, Esq., D. Forbes, Esq., Robert Horner, Esq., Julian Monsarrat, Esq., Hawaii.

"John Herd, Esq., Oahu.

"Each of the above received one package each of the following:

- 1 pkt. *Pinus Ponderosa*,
- 1 pkt. *Pinus Canariensis*,
- 1 pkt. *Pinus Attenuata*,
- 1 pkt. *Pinus Coulteri*,
- 1 pkt. *Pinus Lambertiana*,
- 1 pkt. *Pinus Jeffreyi*,
- 1 pkt. *Sophora japonica*."

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## DIVISION OF ENTOMOLOGY.

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### REPORT ON HORTICULTURAL-QUARANTINE INSPECTION WORK.

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Honolulu, T. H., April 17th, 1907.

To the Honorable Board of  
Commissioners of Agriculture and Forestry,  
Honolulu, T. H.

Gentlemen:—During the past two weeks we have visited fourteen steam and sailing vessels that have arrived in port from

outside the Territory, on which we found 5,643 packages of fruits and vegetables and 8 cases and bales of trees and plants. Half of the latter were intended for other Islands, but were inspected and treated here.

Four hundred crates of potatoes—the first that have arrived from Australia since my residence here—were found to be seri-

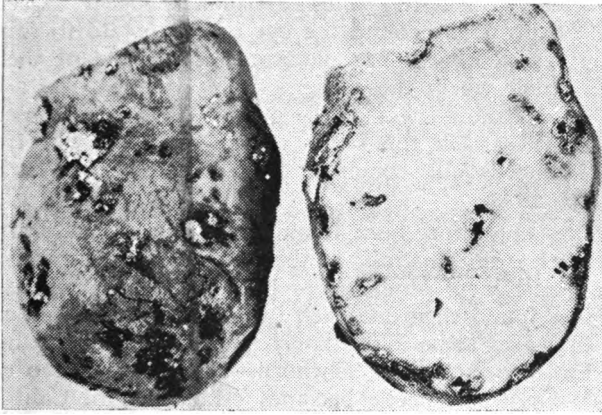


FIG. 10—Australian potatoes infested with caterpillars of potato moth (*Lita solanella*).

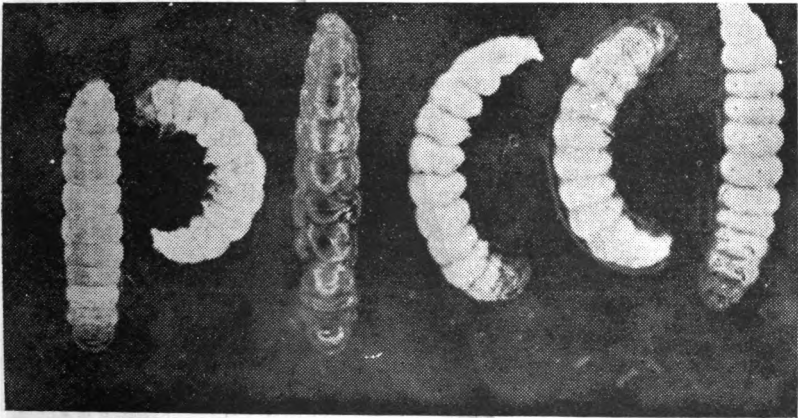


FIG. 11—Caterpillars of potato moth, enlarged about 5 times. Original.

ously infested with the caterpillars of the "potato moth" (*Lita solanella*). The crates with the potatoes were ordered back upon the steamer and the Captain was instructed to see that all were dropped overboard when the ship was one day from port. A sworn affidavit, attested to by the Captain, First Officer and Purser to be delivered to me by return. The potatoes were so seriously infected that not a single one could be found without one or more worms and some were so badly attacked that not an inch of sound tuber was left. The caterpillars appear to select or prefer the depression around the eye of the potato to spin their cocoons. Mr. Kotinsky has photographed a few of the caterpillars and their work; these photographs will give you a clearer idea of the destructiveness of the pest. We are not aware that this moth will attack the sweet potato or yams, but from its scientific name would conclude that it confines its attack to ordinary potatoes.

Garlic has heretofore been found free from insects, but on the same steamer from Australia as the infested potatoes arrived, six cases of garlic were landed here by mistake and my assistant, Mr. Jordan, found them attacked by a small brown beetle, so he ordered the cases to be immediately placed on board again and I advised the inspector—Mr. Ehrhorn—at San Francisco of their condition, for if the beetle becomes established in California it would be liable to reach us from there.

On the S. S. "Hilonian" that arrived from San Francisco on the 12th inst, amongst her freight we found seventy boxes of scale infested apples that we had reshipped to California on the S. S. "Sierra," sailing the same evening for San Francisco.

On the S. S. "Korea" Mr. R. H. Sawyer, representing the Department of Agriculture, Washington, D. C., returned from Japan where he had been sent by Secretary Wilson to secure the best variety of "rush" (*Juncus*) for the manufacture of the very best matting. Mr. Sawyer succeeded in accomplishing his mission with the assistance of a number of guards to see that the plants were not confiscated by the Japanese, as they strongly object to any of such plants being exported to other countries. The *Juncus* were carefully fumigated, as the four baskets were for experimental culture here on the Islands.

In the packages received by mail was one containing acorns attacked by weevil beetles that we confiscated. Thirty-four packages of plants and seed arrived by mail and were carefully examined.

Respectfully submitted,

ALEXANDER CRAW,

Superintendent of Entomology and Inspector.



**DIVISION OF FORESTRY.****ADDITIONS TO THE KOOLAU AND HANA FOREST RESERVES—MAUI.**

Acting under the provisions of Act No. 4 of the Session Laws of 1907, the Superintendent of Forestry brought before the Board of Agriculture and Forestry at the meeting held on April 30, 1907, a recommendation to increase the area of government land actually set apart in the forest reserves established in the districts of Koolau and Hana, Island of Maui. Under the old law these lands were included within the reserves but were not subject to the control of the Board in any way. By the proposed action they will be set apart as integral portions of the two reserves. During the period of existing leases all the rights acquired thereunder will continue to be exercised by the lessees, but upon the expiration of the leases, the lands will automatically come into the fully reserved class. The area of the lands to be so set apart in the Koolau Forest Reserve is 15,930 acres; in the Hana Forest Reserve, 7,013 acres.

The advantage of this new law is that it enables adjoining owners and other persons interested to know definitely what the Government's policy will be in regard to certain forest lands when the existing leases run out. In the Koolau Reserve the reservation of these lands fulfills the Government's obligation under the agreement entered into last autumn with the plantations controlled by the Alexander & Baldwin interests.

As usual with forest reserve projects, the report of the Superintendent of Forestry and the resolutions adopted by the Board are published herewith.

**RESOLUTION RELATING TO THE KOOLAU (MAUI) FOREST RESERVE.**

**RESOLVED**, That those certain lands in the District of Koolau, Island of Maui, described in general terms as follows: Those portions of the government lands of Honomanu; Keanae, Mauka; Wailua, 1 and 2 Mauka; Wailua-Ulaino Forest, two tracts; within the boundary of the Koolau Forest Reserve and containing an area of 15,930 acres, more or less, as recommended in a report of the Committee on Forestry, made on April 30, 1907, based on report of the Superintendent of Forestry, dated April 23, 1907, which reports are on file in the office of the Board of Agriculture and Forestry; the boundaries of which proposed reservation more particularly appear

by and on a map made by the Hawaiian Government Survey Department, which said map is now on file in the said Survey Department, marked "Registered Map No. 1268," and "Koolau (Maui) Forest Reserve;" and a description accompanying the same numbered C. S. F. 1630, which said description is now on file in the said Survey Department; copies of which said map and description are now on file in the office of this Board and made a part hereof; be approved as portions of the Koolau (Maui) Forest Reserve.

RESOLVED, That the Board recommends to the Governor that the government lands lying within the boundaries of the said Koolau (Maui) Forest Reserve be set apart by him, subject to vested rights therein, after the hearing required by law, as portions of the Koolau Forest Reserve.

Adopted at a meeting of the Board of Agriculture and Forestry, held on April 30, 1907.

#### RESOLUTION RELATING TO THE HANA FOREST RESERVE.

RESOLVED, That those certain lands in the District of Hana, Island of Maui, described in general terms as follows:

Those portions of the government lands of Koali-Puuhaoa, Wakiu, Kawela-Kaeleku, East Honomale, and the Hana Forest Tract, within the boundary of the Hana Forest Reserve and containing an area of 7.013 acres, more or less, as recommended in a report of the Committee on Forestry, made on April 30, 1907, based on report of the Superintendent of Forestry, dated April 23rd, 1907, which reports are on file in the office of the Board of Agriculture and Forestry; the boundaries of which proposed reservation more particularly appear by and on maps made by the Hawaiian Government Survey Department, marked "Registered Maps No. 1268 and 1750," and "Hana Forest Reserve, Maui;" and a description accompanying the same, numbered C. S. F. 1690, which said description is now on file in the said Survey Department; copies of which said maps and description are now on file in the office of this Board and made a part hereof; be approved as a portion of the Hana Forest Reserve.

RESOLVED, That the Board recommends to the Governor that the government lands lying within the boundaries of the said Hana Forest Reserve be set apart by him, subject to vested rights therein, after the hearing required by law, as portions of the Hana Forest Reserve.

Adopted at a meeting of the Board of Agriculture and Forestry held on April 30, 1907.

## REPORT OF THE COMMITTEE ON FORESTRY.

At the meeting of the Board held on April 30th, 1907, Mr. A. W. Carter, Chairman of the Committee on Forestry, verbally reported that the Committee approved the recommendations contained in Mr. Hosmer's report on a proposed change of status in certain of the lands in the Koolau and Hana Forest Reserves on Maui, and recommended to the Board that the matter be brought to the Governor's attention in the usual way.

By vote of the Board, this report was approved and adopted.

## REPORT OF THE SUPERINTENDENT OF FORESTRY.

Honolulu, April 23, 1907.

Committee on Forestry, Board of Commissioners of Agriculture and Forestry, Honolulu.

Gentlemen:—Act No. 4 of the Session Laws of 1907 amends Chapter 28 of the Revised Laws of Hawaii, by empowering the Governor to set apart government land as forest reserves, whether it is under lease or not, provided that if the land is under lease, the reservation shall not affect the vested rights thereby acquired. Under the terms of this act I hereby recommend the reservation as "lands actually set apart" of the tracts of government land now under lease, within the boundaries of the Koolau and the Hana Forest Reserves on Maui.

The reasons for the creation of the forest reserves on the windward side of Maui were fully discussed by me in former reports. The arguments there set forth apply with equal force to the lands now under consideration, which form integral parts of the two reserves as established. They need not be repeated here.

For purposes of reference it may be stated that my report upon the Koolau Forest Reserve was made under the date of July 28, 1905, published in the *Forester and Agriculturist* for August, Vol. II, pp. 234-240. Reports on the Hana Reserve were made on March 2 and April 6, 1906, published in the *Forester and Agriculturist* for November, 1906, Vol. III, pp. 353-358. The Koolau Forest Reserve proclamation appeared in the *Forester* for September, 1905, Vol. II, pp. 272-273; that of the Hana Reserve in the issue for December 1905, Vol. III, pp. 418-419.

In connection with the setting apart of the lands in the Koolau Reserve it should be borne in mind that in the agreement entered into last autumn between the Government and the Alexander & Baldwin plantations, whereby the manage-

ment of the private land in the Koolau Reserve was turned over to the Board, the Government bound itself:

"That all lands now held and owned by said Territory of Hawaii and that it may hereafter acquire during said period of this surrender, upon such acquisition, within said boundaries hereinbefore specifically set forth, *except* the lands within said boundaries covered by Government leases Nos. 538 and 539, both dated February 26, 1902, made by the Commissioner of Public Lands for and on behalf of the Territory of Hawaii to H. P. Baldwin, shall likewise be immediately set apart as a forest reserve for said purposes, as far as and as soon as it is able so to do under the laws of said Territory.

"That at least immediately upon the relief or release within said period of this surrender of all, or any part, of the lands covered by said Government Leases Nos. 538 and 539, from said leases, or either of them by expiration or termination or otherwise the lands within said boundaries so relieved or released shall be set apart as a forest reserve for said purposes; *but*, if possible under the laws of said Territory at any time within said period of this surrender before such relief, release or releases, then as soon as thus possible, the lands within said boundaries covered by said leases shall be set apart as a forest reserve for said purposes.

"That all lands set apart as hereinbefore specified as a forest reserve and all lands now held, controlled or owned by said Territory of Hawaii, within said boundaries that have already been set apart as a forest reserve for said purposes, shall be used and maintained during said period of seventeen years covered by this surrender as a forest reserve for forestry purposes according to the general purposes of the present forestry laws of the Territory of Hawaii, except where such use and maintenance will be inconsistent with the rights now existing of third persons in any of said lands, in which cases upon the termination of any such right or rights, such use and maintenance shall immediately be in the lands relieved therefrom and shall thereafter continue throughout said period of seventeen years covered by this surrender."

Under the law as it stood before the amendment enacted last month, only the land of Honomanu, 2,000 acres, in the Koolau Reserve and the small portions of E. Honomalele and the Kawela-Kaeleku tract, 80 acres, in the Hana Reserve could be set apart. The advantage of the amendment is at once apparent when in these two reserves alone it permits 22,943 acres to be put into the permanently reserved class.

That there may be no misunderstanding of the terms of the present law I may again remark that the reservation goes into full effect only on the expiration of the existing leases, all

rights acquired thereunder being guaranteed to the lessee during the term of the lease.

For the reasons above set forth I now recommend that the Board requests the Governor, to set apart, after the hearing required by law, the portions of the following named government tracts within the boundaries of the Koolau and Hana Forest Reserves as integral parts of those reserves.

Following is a list of the lands to be so set apart:

#### KOOLAU FOREST RESERVE.

Honomanu, 2,000 acres; Lease No. 52; Expires July 1, 1908.

Keanae, Mauka, 8,750 acres; Lease No. 539; Ex. Feb. 26, 1923.

Wailua, 1 and 2, Mauka, 1,280 acres; Lease No. 539, Expires Feb. 26, 1923.

Wailua-Ulaine Forest, 3,000 acres; Lease No. 538; Expires Feb. 26, 1923.

Wailua-Ulaine Forest, 900 acres; Lease No. 492; Expires May 1, 1917.

Total—15,930 acres.

The first three lands were "crown lands."

#### HANA FOREST RESERVE.

Hana Forest, 6,330 acres; Lease No. 492; Expires May 1, 1917.

E. Honomalele, 15 acres, Kawela-Kaeleku, 65 acres; Lease No. 474; Expires Aug. 17, 1908.

Wakiu, 3 acres; Lease No. 518; Expires May 2, 1920.

Koali-Puuhaoa, 600 acres; Lease No. 479B; Expires Dec. 5, 1913.

Total—7,013 acres.

Total area in Koolau and Hana Forest Reserves—22,943 Acres.

Very respectfully,

RALPH S. HOSMER,

Superintendent of Forestry.

## BOARD OF AGRICULTURE AND FORESTRY.

## DIVISION OF FORESTRY.

## NA PALI-KONA FOREST RESERVE—KAUAI.

At a meeting of the Board of Agriculture and Forestry, held on April 30th, 1907, the project to create a forest reserve on the high plateau on the leeward side of Kauai, known as the Waimea Upland was approved. The proposed Na Pali-Kona Forest Reserve contains a total area of 60,040 acres, of which 40,650 acres is government land. The major part of the government land (36,670 acres) is held under several leases, each of which has some years yet to run. But under the provisions of Act No. 4 of the recently enacted Session Laws of 1907 this area can be set apart at once as a portion of the reserve, subject to the rights existing under the leases. The remainder of the government land (3980 acres) is unleased and can be fully reserved immediately.

In accordance with the usual custom there are published herewith the report of the Superintendent of Forestry upon this proposed reserve and the resolution adopted by the Board in regard thereto.

## RESOLUTION RELATING TO THE PROPOSED NA PALI-KONA FOREST RESERVE.

RESOLVED, That those certain lands in the Districts of Na Pali and Kona, Island of Kauai, bounded in general terms as follows:

Lying on the Waimea Upland, bounded on the South and West by a line drawn across the ahupuaas of Hanapepe, Makaweli and Waimea, between points on the main ridges where the general level of the upland breaks into the steep palis of the canyons; on the Northwest by the palis of Na Pali District; on the North and East by the Districts of Halelea and Puna; and on the Southeast by the land of Wahiawa, and containing an area of 60,040 acres, more or less, as recommended by the Committee on Forestry on April 30, 1907, based on a report of the Superintendent of Forestry dated April 22, 1907, which report is on file in the office of the Board of Agriculture and Forestry; the boundaries of which proposed reservation more particularly appear by and on maps made by the Hawaiian Government Survey Department, which said maps are now on file in the said Survey Department, marked "Registered Map Nos. 2246 and 2375," and "Na Pali-Kona Forest Reserve, Kauai;" and a description accompanying the same, numbered C. S. F. 1757, which said de-

scription is now on file in the said Survey Department; copies of which said maps and description are now on file in the office of this Board and made a part hereof; be approved as a forest reserve to be called the Na Pali-Kona Forest Reserve.

RESOLVED, That the Board recommends to the Governor that the Government lands lying within the boundaries of the said proposed Na Pali-Kona Forest Reserve be set apart by him, subject to vested rights therein, after the hearing required by law, as the Na Pali-Kona Forest Reserve.

Adopted at a meeting of the Board of Agriculture and Forestry, held on April 30, 1907.

## REPORT OF THE COMMITTEE ON FORESTRY.

Honolulu, April 22, 1907,

At the meeting of the Board held on April 30, 1907, Mr. A. W. Carter, Chairman of the Committee on Forestry verbally reported that in the judgment of the Committee the property mentioned in the report of the Forester should definitely and for all time be set apart as a forest reserve. It is essentially forest land and is of greater value for a forest reserve than for anything else. The land cannot advantageously be utilized for any other purpose. The bulk of the property is at a very high elevation and includes many gulches and ridges. A large portion of the area is now very heavily wooded. This property has a tremendous value as a source of water supply to the adjacent agricultural lands.

On behalf of the Committee Mr. Carter recommended that the report of the Forester be adopted and that the usual request be made to the Governor as regards a public hearing.

It being duly moved and seconded, the Board voted to adopt the report of the Committee on Forestry and to request the Governor to take the action desired.

## REPORT OF THE SUPERINTENDENT OF FORESTRY.

Honolulu, April 22, 1907.

Committee on Forestry, Board of Commissioners of  
Agriculture and Forestry, Honolulu.

Gentlemen:—I have the honor to submit the following report, with recommendations, upon the project to create a forest reserve in the Districts of Na Pali and Kona on the Island of Kauai. The report is based on a personal examination of the locality made by me during the summer of 1906, supplemented by information obtained during previous visits to Kauai and in other ways.

## LOCATION.

The section proposed to be reserved is the high table land embracing the upper part of Na Pali and Kona Districts. The area is roughly rectangular in shape, some fifteen miles long by some six miles wide, with the major axis running N. W. and S. E. The tract may be described in general terms as that portion of the Waimea Upland, embracing the mauka portion of the Districts of Na Pali and Kona, Island of Kauai, which is bounded on the South and West by a line drawn across the ahupuaas of Hanapepe, Makaweli and Waimea, between points on the main ridges where the general level of the upland breaks into the steep palis of the canyons; on the Northwest by the palis of Na Pali District; on the North and East by the Districts of Halelea and Puna; and on the Southeast by the land of Wahiawa. The area included within the boundary thus described is given by the Survey Office as 60,040 acres.

## OBJECT.

The purpose in setting apart this section as a forest reserve is essentially that of forest protection. In the area within the boundary above outlined are a number of streams of great potential value for the development of power and for irrigation. The object of the proposed Na Pali-Kona Forest Reserve is permanently to protect the forest on the catchment basins and at the headwaters of these streams against injury of all kinds, that the forest cover may be kept intact and permitted to exert its influence on equalizing and maintaining the flow, as well as by helping to prevent erosion. This last feature is important because it is very desirable that as little material as possible be carried down stream in time of flood, to be deposited on the arable lowlands and also because clear water is an item well worth considering where a stream is to be harnessed to drive power wheels.

Another benefit to be obtained from this reserve is the influence on precipitation that under certain meteorological conditions is unquestionably exerted by a body of forest of the size, and so situated as is that on the Waimea upland. The laws that control the relation of forest and rainfall are not yet understood but the result of their action is sufficiently tangible, in these islands at any rate, to justify their being reckoned with.

## DESCRIPTION.

The proposed Na Pali-Kona Forest Reserve is made up of a few large lands which are at present controlled by a few persons only. The following table gives the names of the several tracts with the area and other information in regard to each. It is based on data furnished by the Survey Office:



## NA PALI DISTRICT.

Na Pali, 130 acres; leased to W. E. H. Deverill; Lease No. 345; Expires July 1, 1913.  
 Na Pali, 6360 acres; leased to W. Kinney; Lease No. 453; Expires July 7, 1917.  
 Na Pali, 3980 acres government land, unleased.  
 Total—10,470 acres.

## KONA DISTRICT.

Waimea, 5808 acres; leased to Knudsen Estate; Lease No. 164; Expires June 1, 1920.  
 Waimea, 3110 acres; leased to Gay & Robinson and transferred to Knudsen Bros.; Lease No. 112; Expires Dec. 27, 1917.  
 Waimea, 21,262 acres; leased to Gay & Robinson; Lease No. 112; Expires Dec. 27, 1917.  
 Makaweli, 10,030 acres; owned by Gay & Robinson, fee simple.  
 Koula and Manuahi, 9360 acres; owned by Gay & Robinson, fee simple.  
 Total—49,570 acres. (Area government land, 30,180 acres.)  
 Total area in Na Pali and Kona Districts—60,040 acres.

## TOPOGRAPHY.

The Waimea Upland is a high plateau very much broken by branching, deep-cut canyons. The average elevation of the summits of the ridges is between 3000 and 4000 feet, the land sloping back gradually to the high ridges in the center of the island that make its back bone.

The upland is divided into three watersheds, the drainage areas of (1) the Hanapepe River, (2) the Waimea River and (3) the various streams that empty directly into the ocean in the Na Pali District. In all essential characteristics the topography of these three systems is of the same order, save that in the canyons of the East and West forks of the Waimea River, the process of degradation has gone further, with the result that larger canyons have been formed, with a greater number of lateral branches.

In the Waimea watershed erosion has gone on so far in the main canyons that the floors of the valleys are cut down to within a few hundred feet of sea level. From the narrow stream bed the canyon walls rise precipitately, in many cases for several hundred feet sheer, while for the remainder of the two thousand or more feet to the top of the canyon, the palis are hardly less steep.

From each of the lateral valleys streams of varying size drop in cascades into the main canyon, bringing motion into

the picture and adding another hue to the bright colors of certain of the outcropping strata.

These features, with the depth of the canyons and the bold sculpturing of the sharply cut dividing ridges into pinnacles and castleated outposts, make the section one of great scenic interest. Indeed in a reckoning of the natural beauties of the Hawaiian Islands the canyons of Kauai, and particularly those of the Waimea and Makaweli Rivers, are to be listed near the top.

The Hanapepe Valley is perhaps not less wonderful than its neighbors to the westward but its beauty is of a different order from that of the great cleft in the island that has been cut by the waters of the Waimea.

In each of the larger valleys at an elevation of about 3000 feet there outcrops a hard stratum that marks the top of all the principal waterfalls. This impervious layer seems to be continuous over a considerable area as it appears in both the Na Pali and the Waimea Districts. It is of more than passing interest because of the part that the waterfalls it controls may some time play in a program of power development.

All the larger tributary canyons carry streams that during the rainy season contain considerable bodies of water. So far as I could learn no systematic measurements had ever been made of the water in these upper streams.

At present water is diverted for irrigation at waterheads in the Hanapepe, Olokele and Waimea Rivers, the last named stream now being tapped in two places, while a third ditch is in process of construction. The water goes to irrigate the cane fields on the neighboring sugar plantations. So far no power has been developed on any of the streams in this section. It is understood, however, that with the completion of the Kekaha Plantation ditch, the ditch that taps the Waimea stream highest up, power is to be developed by dropping the water at two points.

On the plateau is much swampy land, especially in the depressions at the heads of the larger gulches. Here the bottom is at times so soft as to make thorough exploration difficult, if not hazardous; a condition that is, however, admirably adapted for water conservation.

#### THE FOREST.

With the exception of the steep walls of the canyons practically all of the area within the proposed reserve is covered with forest, which protects the swampy ground-cover and makes the section particularly well adapted to absorb and retain the rain water.

A notable feature of the forest on the Waimea, upland is the large number of fine specimens of a considerable variety of forest trees not commonly found in the Hawaiian forests.

Ohia lehua (*Metrosideros polymorpha*) predominates among the trees in mixture. Other important tree species are Koa, (*Acacia koa*), Koolea (*Myrsine lessertiana*), Kopiko (*Straussia*), Ohia ha (*Eugenia sandwicensis*), Iliahi or Sandalwood (*Santalum freycinetianum*), and Kauwila (*Alphitonia ponderosa*).

Among a goodly number of small trees and high shrubs special mention may be made of the Lobelia a characteristic and very noticeable plant in the forest at this elevation, where it reaches its best development.

To both the forester and the botanist the forest on the Waimea Upland is one of the most interesting regions in the Territory, for it is full of problems, the solution of which presents attractive rewards to the scientific investigator.

#### ENEMIES OF THE FOREST.

##### *Wild Cattle.*

In former years cattle grazing was carried on both on the private land of Makaweli and the government land of Waimea. Although this use of the land has now been discontinued for some years there still remain in the forest bands of wild cattle. On the portion of Waimea to the west of the Waimea-Poomau canyon systematic extermination of the wild cattle in the woods was begun by the Knudsen Estate over twenty years ago and continued until the wild cattle were practically all got out or killed. Since 1898 a forest fence, built and maintained by the firm of Knudsen Brothers, has prevented the Knudsen ranch cattle from getting into the forest, which has been treated by the lessees as a private forest reserve.

On Makaweli the extermination of the wild cattle was begun later but for the last few years has been very vigorously carried on by Messrs. Gay & Robinson, with the result that the bands of wild cattle are greatly reduced in number. Under the direction of Mr. Gay a comprehensive system of trails has been constructed that greatly facilitates the hunting of the wild cattle. It is the intention of Messrs. Gay and Robinson to continue this work until the wild cattle are exterminated.

As all ranch stock is kept at the lower levels, the forest within the reserve boundary may properly be regarded as a private forest reserve. It is the intention of Messrs. Gay and Robinson that it be kept so.

##### *Goats.*

The other principal source of injury to the forest in the reserve is from the wild goats. These animals live on the cliffs and are found in each of the large valleys both in the

Kona and Na Pali Districts. The goats are doing much damage by destroying the scanty vegetation on the steep canyon sides and exposed ridges, thus allowing erosion to go on more rapidly, with the result that more debris falls into the valleys and that the side gulches work back faster into the upland. At different times in the past there have been goat hunts and as occasion now offers a few goats are killed but as it is now carried on this work does little toward checking the increase of this pest. Systematic and continued hunting by well trained mountaineers seems to be the only effective way of getting rid of the goats. It is hoped that later, work of this sort can be undertaken as a part of the administration of the reserve.

### *Fire.*

The Waimea Upland has been remarkably free from forest fires. On the Gay and Robinson lands this is doubtless due in large part to the policy of that firm in fining the person who lets the fire start, the fine so collected going into a fund out of which every one who helps put out the fire is liberally paid. It thus becomes an object to respond promptly when the alarm comes. Consequently few fires spread over any considerable area. A system of this sort can of course be made effective only where all the people of a given section are in the employ of a single interest.

### PRIVATE RESERVES.

The action of the Knudsen Brothers and Messrs. Gay and Robinson in protecting the forest from fire, in getting out the wild cattle and in keeping their ranch stock outside the boundaries of the forest has resulted in fact, though not in name, that the area now proposed to be officially set apart has for some years been a private forest reserve.

The creation of the Na Pali-Kona Forest Reserve will officially recognize the reservation and give permanence, on the government land, to an arrangement that less far sighted lessees might not see fit to continue. The control of the government land during the term of the existing leases and of course that of the fee simple property vests in the present lessees or owners, unless some agreement as to forest management is voluntarily entered into with the Government. It is the intention of both the firms named to continue to manage the forest lands under their ownership or control as they have been doing in the past few years. This puts the matter on a satisfactory basis and is a program that at this time the Government is not prepared to improve on.

## THE RESERVE BOUNDARY.

In fixing the limits of the Na Pali-Kona Forest Reserve, advantage has been taken as far as possible of natural boundaries. On the north and east sides it follows the district lines along the main dividing ridge of the island, the proposed reserve joining the head of that in the Halelea district. On the northwest in Na Pali District the line adopted follows the impassible cliff, leaving outside the reserve all the arable land in each of the valleys and on the flats, where there are any, along the connecting trail.

From the Kauhao cliffs to Puuhinahina, on the edge of the great Waimea canyon, an arbitrary line was chosen, principally because in about the location where the line was desired there existed a securely built fence that had since 1898 been maintained by the Knudsen Brothers as the lower boundary of the forest, above which fence cattle had not been allowed to go.

Across the canyon section the line is carried from one prominent point to another—as it also is across the private lands of Makaweli and Hanapepe. This section is for the most part naturally protected and where the upper levels are accessible to cattle a few short stretches of fence across narrow ridges would completely isolate the area above the line.

In the section east of the Waimea canyon below the forest line the flats on the lower ridges are sufficiently large to be valuable as grazing land. These ridges have long been without forest and are now covered by a dense stand of lantana, the spread of which has now been checked by its insect enemies. Were the lantana got out the area might well be stocked again with useful grasses and become good grazing land. Because of the limited amount of pasture on Kauai it is important that areas which legitimately can be put to this use be not interfered with. The lack of water and the difficulty of irrigation make it doubtful if these detached flats could be used advantageously for more intensive forms of agriculture. Across the private lands of Makaweli and Hanapepe the location of the line was discussed with, and meets the approval of the owners, Messrs. Gay and Robinson.

The only points that now remain to be considered are a few small open flats within the reserve and one or two little park-like valleys on the western side of the Waimea canyon. In one of these valleys, at a place called Halemanu, is a mountain camp maintained by the Knudsens, and nearby is another built by Mr. Faye, manager of the Kekaha Plantation. In my judgment the best use to which such areas can be put is as sites for recreation camps and mountain houses. And I believe that with proper restrictions and limited, non-transferable leases, these areas can be so used without detriment to the

objects of the reserve and to better advantage than in any other way. The areas of open land are at too high an elevation, too restricted in size and too far distant from the coast to have other value than for some such purpose.

The only agricultural land in the canyons inside of the forest line is found in the Koaie gulch, a branch of the Waimea canyon. This area, which could be used for grazing, has been excluded, by description, from the Reserve. The area is 530 acres.

#### RECOMMENDATION.

On the basis of the facts herein set forth I now recommend that the Board requests the Governor to create as the Na Pali-Kona Forest Reserve the area within the boundary hereinafter technically described and to set apart as portions thereof, after the hearing required by law, the unleased portions of the government land in the District of Na Pali (to be set apart definitely and at once) and the leased portions of the government lands of Na Pali and Waimea (to be set apart under the provisions of Chapter 28 of the Revised Laws, as amended by Act No. 4 of the Session Laws of 1907), within the boundary of the Na Pali-Kona Forest Reserve.

#### DESCRIPTION.

[Here follows in the original a technical description of the Reserve boundary, prepared by the Survey Department. It is here omitted as it also forms a part of the official proclamation, to be published in full in a later issue.]

Very respectfully,

RALPH S. HOSMER,  
Superintendent of Forestry.

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#### BY AUTHORITY.

Notice is hereby given that C. S. Holloway, Esq., has been appointed President of the Board of Agriculture and Forestry, vice W. M. Giffard, resigned.

A. L. C. ATKINSON,  
Secretary of Hawaii.

Executive Building, Honolulu, May 21, 1907.

## DIVISION OF ANIMAL INDUSTRY.

Rule 4.—To amend Rule 1 of the Division of Animal Industry governing the inspection and testing of imported live stock.

It having been found impracticable, for want of competent inspectors, to have horse stock (including mules and asses) and cattle submitted to respectively the mallein and the tuberculin tests at any other port than Honolulu, it is ordered that paragraph 4 of Rule 1 of the Division of Animal Industry of this Board be and is hereby amended to read as follows:

“Until further notice the port of Honolulu shall constitute the only port for horse stock and cattle, unless the same shall be accompanied by certificates of mallein or tuberculin tests as provided for in Rule 2 of the Division of Animal Industry of this Board.”

Any violation of this rule is a misdemeanor.

This regulation shall take effect at once.

W. M. GIFFARD,  
President and Executive Officer,  
Board of Agriculture and Forestry.

Approved May 2, 1907.

G. R. CARTER,  
Governor of Hawaii.

ACT 112.

AN ACT

TO AMEND SECTION 390 OF THE REVISED LAWS OF HAWAII.

*Be it Enacted by the Legislature of the Territory of Hawaii:*

Section 1. That Section 390 of the Revised Laws of Hawaii be and the same is hereby amended to read as follows:

“Section 390. Penalty for Violations. Any person violating any of the provisions of this Chapter, or any rule or regulation of the Board of Commissioners of Agriculture and Forestry, and any master of any vessel which shall bring into this Territory any article which the Board shall at any time prohibit from being imported into this Territory; and the master of any vessel from which shall be landed any article in this Chapter required to be inspected, until he shall have received a permit to land the said articles from the Board or its officer or inspector, as in this Chapter provided, shall be guilty of a misdemeanor and shall be punished by a fine not to exceed five hundred dollars.

Section 2. This Act shall take effect from and after the date of its approval.

Approved this 30th day of April, A. D. 1907.

G. R. CARTER,  
Governor of the Territory of Hawaii.

4. Thence around the palis of the Milolii Valley to Anaki Peak, a prominent point on the edge of the pali;

5. Thence directly west down the pali to the foot of same;

6. Thence in a general northeasterly direction following the foot of the main palis around the valleys of Keahole and Nualolo in the land of Milolii to a point on the boundary between the Kona and the Na Pali districts;

7. Thence in a southeasterly direction along the ridge dividing the Kona and Na Pali districts to Pohakuwaawaa, a prominent peak in said ridge;

8. Thence in a southwesterly direction along the edge of the pali overlooking the Halemanu Valley to the initial point.

Area, 5,808 acres.

Portion of Government land in the district of Na Pali, within the Na Pali-Kona Forest Reserve, Kauai, not covered by lease.

Part I. Beginning at Pihea, a prominent peak on the main ridge bounding the districts of Kona and Na Pali, and running:

1. In a southwesterly direction along said main ridge to Pohakuwaawaa, a prominent peak in said ridge;

2. Thence in a northwesterly direction along said ridge to the foot of the main pali;

3. Thence in a general northeasterly direction following the foot of the main palis around the valleys in this section to a point on the northeast boundary of the land of Kalalau, said valleys being named as follows: Awaawapuhi, Honopu and Kalalau;

4. Thence in a southeasterly direction along the northeast boundary of Kalalau, along Lease 453, to the initial point.

Part II. All that portion of the district of Na Pali lying between the northeast boundary of the ahupuaa of Hanakapi'ai, Lease 345, and the southwest boundary of the ahupuaa of Haena, and bounded on the southeast by the main ridge dividing Haena and Wainiha and on the northwest by the foot of the main pali running along the coast of Na Pali.

Area of the two parts, 3,980 acres.

Portion of Government land in Na Pali within the Na Pali-Kona Forest Reserve, Kauai, and covered by Lease 453.

Beginning at Pihea, a prominent peak on the main ridge bounding the districts of Na Pali and Kona, and running:

1. In a northwesterly direction down the ridge along the northeast boundary of the land of Kalalau to the foot of the main pali;

2. Thence in a general northeasterly direction following the foot of the main palis around the valleys in this section to a point on the southwest boundary of the land of Hanakapi'ai, said valleys being named as follows: Pohakuao, Waiolaa, Hanakoa, Wai'aa, Wai'ahuakua, Wai'ahuakanaka;

3. Thence in a southeasterly direction along the ridge bounding the land of Hanakapi'ai to a point near Kilohana, at the junction of the districts of Kona, Na Pali and Halelea;

4. Thence in a northwesterly direction along the main ridge dividing the districts of Kona and Na Pali to the initial point.

Area, 6,360 acres.

That portion of the ahupuaa of Hanakapi'ai in the district of Na Pali, within the Na Pali-Kona Forest Reserve, Kauai, and covered by Lease 345, includes all of the land of Hanakapi'ai lying above and south of the foot of the main pali running along the coast of Na Pali, and contains an area of 130 acres, more or less.

In witness whereof, I have hereunto set my hand and caused the seal of the Territory of Hawaii to be affixed.

Done at the Executive building, in Honolulu, this 12th day of June, A. D. 1907.

A. L. C. ATKINSON,  
Acting Governor of Hawaii.



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### NOTICE FROM THE DIVISION OF ENTOMOLOGY.

The Entomological Division of this Board wishes to inform Hawaiian readers of this magazine that it is always ready and anxious to receive, study and report upon any insects that they may find and submit. When feasible either colonies of beneficial insects will be sent, or simple, inexpensive remedies will be prescribed. No charge.

# THE HAWAIIAN FORESTER AGRICULTURIST

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OCTOBER, 1907

No. 10

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## *RUBBER CONVENTION.*

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On Saturday, October 12, the first Rubber Convention ever held upon American soil took place at the Nahiku Rubber Company's plantation on Maui. A representative gathering of those engaged in the new industry was present, as well as a number of the important official and business residents of the Territory.

A specially chartered steamer left Honolulu the previous Friday, carrying about thirty members to the convention. At Lahaina and Kahului others joined the party, which numbered about sixty in all when Nahiku was reached the following morning.

### *RUBBER TAPPING.*

Early in the day Mr. Bradford of the U. S. Experiment Station, gave a practical demonstration of tapping. During the experiment the operator explained the various processes connected with drawing off the latex and its collection and coagulation.

### *RUBBER ON MAUI.*

The cultivation of rubber has been engaging the attention of a small number of growers in the Nahiku district of Maui for some years past, but it was not until 1905 that the first company was formed to devote itself solely to the production of rubber. Other vigorous companies have now entered the field, until now the Nahiku Rubber Company, Hawaiian-American Rubber Company, the Koolau Plantation, and many private growers, among whom Messrs. W. G. Scott and F. Wittrock are prominent, have between them nearly half a million rubber trees in cultivation.

tion to water-shed as distinguished from a forest on an area from which there is no normal water flow; and the adoption of the policy so formulated by the Board of Agriculture and its approval by the Governor.

Third, the negotiation by the Hawaiian Mahogany Lumber Company, an Hawaiian corporation, of a contract with the Atchison, Topeka & Santa Fé Railroad Company, under which the former has undertaken to deliver to the latter something over 500,000 Ohia railroad ties per annum for the next five years.

Fourth, the demonstration, on a large scale, that Rubber grows well in Hawaii and can be made a profitable industry here; with the incidental effect that a large area will be planted up in rubber trees, which, from a forest protection of the land standpoint, are as good as any other variety of trees.

All of these four matters are of vital interest, not only to the citizens of the Territory of Hawaii at large, but especially to the sugar planters, as I will seek to hereinafter show.

Taking up the above subjects in the order named:

## PINCHOT ON FOREST FAILURE

### FIRST. THE LUMBER SHORTAGE AND HARD-WOOD FAMINE IN THE UNITED STATES.

Gifford Pinchot, chief of the United States Forest Service, in an article published in *The Outlook* for October 12, 1907, makes the following statement:

After enumerating the statistics showing the amount of standing timber now in the United States; the present annual consumption and the present annual growth, he states:

\* \* \* "The result shows a probable duration of our supplies of timber of not more than thirty-three years.

"Estimates of this kind are almost inevitably misleading. For example, it is certain that the rate of consumption of timber will increase enormously in the future, as it has in the past, so long as supplies remain to draw upon. Exact knowledge of many other factors is needed before closely accurate results can be obtained. The figures cited are, however, sufficiently reliable to make it certain that the United States has already crossed the verge of a timber famine so severe that its blighting effects will be felt in every household in the land.

"The rise in the price of lumber which marked the opening of the present century is the beginning of a vastly greater and more rapid rise which is to come.

"We must necessarily begin to suffer from the scarcity of timber long before our supplies are completely exhausted.

"It is well to remember that there is no foreign source from

which we can draw cheap and abundant supplies of timber to meet a demand per capita so large as to be without parallel in the world, and that the suffering which will result from the progressive failure of our timber was but faintly foreshadowed by the recent temporary scarcity of coal.

### WHEN THE FORESTS FAIL.

"What will happen when the forests fail?

"In the first place, the business of lumbering will disappear. It is now the fourth greatest industry in the United States.

"All forms of building industries will suffer with it, and the occupants of houses, offices, and stores must pay the added cost.

"Mining will become vastly more expensive; and with the rise in the cost of mining there must follow a corresponding rise in the price of coal, iron, and other minerals.

"The railways, which have, as yet, failed entirely to develop a satisfactory substitute for the wooden tie (and must, in the opinion of their best engineers, continue to fail), will be profoundly affected, and the cost of transportation will suffer a corresponding increase.

"Water power for lighting, manufacturing and transportation, and the movement of freight and passengers by inland waterways, will be affected still more directly than the steam railways.

"The cultivation of the soil, with or without irrigation, will be hampered by the increased cost of agricultural tools, fencing, and the wood needed for other purposes about a farm. Irrigated agriculture will suffer most of all for the destruction of the forests means the loss of the waters as surely as night follows day.

"With the rise in the cost of producing food, the cost of food itself will rise. Commerce in general will necessarily be affected by the difficulties of the primary industries upon which it depends.

### A SUICIDAL POLICY.

"In a word, when the forests fail, the daily life of the average citizen will inevitably feel the pinch on every side. And the forests have already begun to fail, as the direct result of the suicidal policy of forest destruction which the people of the United States have allowed themselves to pursue. \* \* \*

"We are accustomed, and rightly accustomed, to take pride in the vigorous and healthful growth of the United States, and in its vast promise for the future. Yet we are making no preparation to realize what we so easily and glibly foresee

and predict. The vast possibilities of our great future will become realities only if we make ourselves, in a sense, responsible for that future.

"The planned and orderly development and conservation of our natural resources is the first duty of the United States."

### MORE EXPERT EVIDENCE.

In a report on the timber supply of the United States, made by R. S. Kellogg of the Federal Forest Service in April, 1897, he makes the following statements:

"The lavish manner in which the United States has consumed the products of its forests and the rapidity with which our timber supply is melting away are wholly unappreciated by those who have never given the matter more than passing consideration. \* \* \*

"Rapidly as the population of the United States has increased the lumber consumption has increased still more rapidly. In round numbers, the lumber cut in 1880 was 18 billion feet; in 1890, 24 billion feet, and in 1900, 35 billion feet. The increase in population from 1880 to 1900 was 52% but in lumber cut 94%.

"The original stand of white pine in the Northeast, is almost entirely cut out. The present stand in the Northeastern States is mainly spruce, second-growth white pine and hemlock.  
\* \* \*

"It is well known that the days of white pine are rapidly passing and \* \* \* it will in a few years cease to be a large factor in the timber supply of the United States.

### SAW MILLS GO OUT OF BUSINESS.

"At the last annual meeting of the Northern Pine Manufacturers' Association in Minneapolis, Minnesota, the secretary presented the following statement:

"Since 1895, 248 firms, representing an annual output of pine lumber of  $4\frac{1}{4}$  billion feet, have retired from business, due to the exhaustion of their timber supply. Plants representing approximately 500 million feet capacity which sawed in 1906 will not be operated in 1907."

"The amount of hardwood stumpage is rapidly decreasing. The hardwood cut in 1900 was 8 billion feet, in 1904, 6 billion feet, and the present annual cut of hardwoods is about 5 billion feet.

"As an instance of the timber shortage in the East it is stated that in New England 6 inches is now a common cutting diameter for white pine, while formerly, and where lumbering is intelligently done, 18 inches is the minimum limit.

"We are rapidly using up our forest capital. Our present annual consumption of wood in all forms is from three to four times as great as the annual increment of our forests. \* \* \* Every indication points to the fact that under present conditions the maximum annual yield of forest products for the country as a whole has been reached, and that in a comparatively short time there will be a marked decrease in the total output, as there is now in several items. Neither is there any great supply of timber to turn to outside of the United States. With the exception of importations of small quantities of high-class woods like mahogany, the only promising source is Canada; but most of the timber there will be required at home. Even now Douglas fir (Northwest) is bringing higher prices in Canada than in American markets."

#### DR. FERNOW ON THE LUMBER SHORTAGE.

In February, 1907, Dr. B. E. Fernow, one of the leading forestry authorities in the United States, made the following statement in an article published in *Forestry and Irrigation* for February, 1907:

"One hundred and fifty years ago Germany found herself in very much the same condition as regards her forest resources as we are today in the United States—all accessible portions more or less culled, or in poor coppice, burnt over, and damaged by cattle, the valuable virgin timber mostly confined to distant and inaccessible locations. Sporadic attempts existed here and there at protection, at regulation of the cut, at conservative lumbering, and still more sporadic attempts at reforestation. \* \* \* Yet until the beginning of the nineteenth century reduction of supplies without adequate reproduction proceeded, and around the year 1800 the wood famine had become acute, giving rise to the same kind of agitation and literature which we have experienced, even to bringing in the catalpa, and other such small rapid growers as the saviors of the nation.'

#### PROFITABLE FORESTRY IN EUROPE.

"The severity of the timber shortage in Germany at that time was temporarily relieved through increased production of coal and the building of railroads in hitherto inaccessible forest regions. Then came the vigorous organization of a settled policy of forest management, based upon the principle of sustained yield, or the cutting of the increment only, without lessening the wood capital. The results of this policy were that in Saxony the cut increased between the years 1820 and 1890 just 50%, and up to 1904 has increased by another 5%.

"In Prussia, in 1830, the cut was 20 cubic feet per acre, and in 1865 increased to only 24 cubic feet. In 1890 it was 52, and in 1904 it had grown to 65 cubic feet. Forest management increased the average acre production in 75 years more than threefold.

"Every acre of forest in Germany,—State, Municipal and private; good, bad and indifferent, productive and unproductive, now yields an average net profit of \$2.40 per acre annually, representing 5% on a valuation of \$50 per acre, and this is constantly improving.

"It must not be overlooked that these results have come largely from non-agricultural lands, the sandy plains, the swamps, the rough mountain slopes, and from forests which were mismanaged like ours.

"Can we expect to attain the same or similar results?

"We ought to do much better, for we have the hundred years of experience of our friends across the water to draw on and we can avoid many of the mistakes which they have naturally made and paid for."

#### HALL ON THE HARDWOOD FAMINE.

In the report by William L. Hall, assistant forester of the United States, on "The Waning Hardwood Supply of the United States \* \* \*" dated September 24, 1907, and which has just arrived in Honolulu, he makes the statement that the cut of hardwood lumber in the United States decreased 15 per cent. between 1899 and 1906.

"This decrease took place during a period when American industries sprang forward at a pace unparalleled; when there was the strongest demand ever known for every class of structural material; when the output of pig iron increased 15 per cent., that of cement 132 per cent. and even that of softwood timber 15 per cent.

"That the decrease is due to diminished supply rather than to lessened demand seems to be proved beyond question. During the same period the wholesale price of various classes of hardwood lumber advanced from 25 to 65 per cent.; every kind of hardwood found in quantity sufficient to make it useful has been put on the market, and hardwood timber is now being cut in every State and every locality where it exists in quantity large enough to be cut with profit. These conditions could not prevail were the decrease in production due to a falling off in demand.

#### DECREASE OF HARDWOOD SUPPLY.

"Since 1899 the production of oak has decreased 36 per cent.; of yellow poplar, 37 per cent.; of elm, 50 per cent.; of cottonwood, 36 per cent. and of ash 20 per cent."



It is stated that the shortage is being made up by resorting to the inferior hardwoods, and, "although almost all possible new woods have been brought into use there has still been a shrinkage in the total output of 15 per cent.

"The supply in Indiana and Ohio, the original center of hardwood production, is practically exhausted. \* \* \* In all of the States West of the Mississippi Valley the supply is small and can never become much of a factor. The impressive thing is that we are bringing hardwoods from far and near, and still the cut is going down.

"The southern part of Michigan, which originally bore magnificent hardwoods, was the first part of the State to be cleared. \* \* \* The same is true of Wisconsin and Minnesota. The almost complete exhaustion of their timber supply, and the transformation of their hardwood lands into farms are apparently the only results to be expected. \* \* \* In the Appalachian, as in the other regions, the hardwood lumbermen are working upon the remnants. The supply is getting short and the end is coming into sight."

#### ONLY SIXTEEN YEARS' SUPPLY LEFT.

Mr. Hall estimates that from the statistics of present supply of hardwood and present annual use of the same there exist in the United States today only sixteen years' supply.

He says that since 1898 the price of hard maple per thousand feet board measure has increased from \$20 to \$32.50 per thousand; of yellow poplar, from \$30 to \$53.50 per thousand; of hickory, from \$45 to \$65 per thousand, and of quartered white oak, from \$60 to \$80 per thousand.

Accompanying this increase in price has been a lowering of the standard.

Prior to 1907 the rules of the trade required even lengths, with a minimum length of 6 feet. In 1907 the Hardwood Lumber Association reduced the minimum to lengths of 4 feet and allowed odd lengths.

"IT EMPHASIZES THE FACT THAT WE ARE DOWN TO THE ROCK BOTTOM AND REQUIRE EVERY SOUND PIECE OF HARDWOOD LUMBER THAT CAN BE PUT UPON THE MARKET."

Between 1899 and 1906 the number of employes in the hardwood industry in Ohio decreased 40 per cent. and in Indiana 42 per cent.

An enumeration is given of the businesses directly depending upon hardwood, viz: Lumber, cooperage, furniture, vehicles, musical instruments, small wooden-ware, agricultural implements, cars, boxes and crates, railroad ties, telephone and telegraph poles and house finishing.

Mr. Hall concludes:

"The exhaustion of the hardwood supply means the loss of these industries to the States in which they are located. \* \* \* How intensely the whole country would feel the loss of its hardwood timber \* \* \* can scarcely be realized. \* \* \* A general failure in crops may affect industrial conditions for a few years—a failure in the hardwood supply would be a blight upon our industries through more than a generation.

### THE SITUATION IN BRIEF.

"The situation in brief is this: We have about a fifteen years' supply of hardwood lumber now ready to cut. \* \* \* The inevitable conclusion is that there are lean years close ahead in the use of hardwood timber. There is to be a gap in the supply which exists and the supply which will have to be provided. How large that gap will be, depends upon how soon and how effectively we begin to make provision for the future supply. The present indications are that in spite of the best we can do there will be a shortage of hardwoods running through at least fifteen years. How acute that shortage may become and how serious a check it will put upon the industries concerned cannot now be foretold. That it will strike at the very foundation of some of the country's most important industries is unquestionable. This much is true beyond doubt, that we are dangerously near a hardwood famine and have made no provision against it."

After designating possible substitutes for hardwoods, such as metal, concrete and softwoods, Mr. Hall says:

### THE ONLY PRACTICABLE SOLUTION.

"There seems to be but one practicable solution, and that is to maintain permanently, under a proper system of forestry, a sufficient area of hardwood land to produce by growth a large proportion of the hardwood timber which the nation requires. \* \* \* The longer the delay in putting the forest under control, the longer continued and more extreme will be the shortage."

The foregoing statements are those of professional salaried experts, with nothing to gain by exaggeration, and are based upon statistics made with all the exhaustive resources of the United States Treasury.

These statistics are brought right up to the year 1907, and bring home to us, as nothing that I have yet seen does, the fact that not only forest protection but forest reproduction is of vital import to the sugar industry, as well as every other industry in Hawaii.

We have for years been unthinkingly cutting off our forests for firewood; devastating them with cattle; carelessly allowing their destruction by wild goats, and paying practically no attention to reforestation; while we have imported not only all kinds of both soft and hardwood, both manufactured and unmanufactured, for general domestic use, but have also been importing even our railroad ties, telephone poles and fence posts.

Within the year we have been brought up against the fact that not only have prices gone ballooning, but that even railroad ties and fence posts are hard to obtain even at the advanced prices. If prices of lumber in general, and hardwood in particular, are going to be prohibitory in the United States, where the material is produced, they are going to be more so here, where the added freight must be reckoned with.

### THE REMEDY IN HAWAII.

What is the remedy?

There is and can be only one remedy. It is the same here that it is in the United States, and the same there that it was in Europe when they faced the same condition a hundred years ago.

The remedy is to stop unnecessary destruction of forests and immediately begin reforestation, both by protection of semi-forested areas, so that partly destroyed forests will return by natural means; and by replanting.

This should be done both through the medium of private effort and public appropriation.

It lies within the power of every sugar plantation and every cattle ranch in the Territory to, within the year, at an expense so small that it bears no comparison to the benefits to be derived, shut out cattle from every portion of the land which ought to be in forest, and, if no more is done, to plant along roadways, around house-lots, in gulches, waste land and on steep hill sides unsuitable for agriculture, trees enough to, within the next ten years, supply a very large proportion, if not the whole of the fence posts, railroad ties, telephone poles and firewood needed for consumption in the Territory.

### RAPID GROWING HARDWOODS.

The few years during which there has been a skeleton of a forestry department maintained by the government in Hawaii has demonstrated that we have available a highly valuable assortment of rapid growing hardwood trees, such as a number of the varieties of the eucalypti, the iron woods, the silver oak and some of the acacias, besides that most valuable lumber tree, the Japanese pine.

We do not need any statistics or foreign expert advice upon this subject. The forestry experiments which have been carried on by the government on the ridges back of Honolulu; by the Lihue Plantation and George Wilcox on Kauai; by the Baldwin plantations; the Haleakala Ranch and by Captain Makee at Ulupalakua on the island of Maui, and by the Pacific Sugar Company on Hawaii, have already demonstrated what these trees will do.

### RESULTS ON HALEAKALA RANCH.

As to what can be accomplished by continuous effort at small expense, I speak only as to my own knowledge in connection with the Haleakala Ranch on Maui, where, within the past seven years, at an expense of less than \$500 a year, there have been planted out and are now growing well about 60,000 trees, which are already beginning to yield timber for fencing and all necessary ranching purposes.

During the past summer on this ranch there were cut from thirty-three second-growth *rastrada eucalyptus* trees 230 good fence posts.

There is no reason why equally good results cannot be obtained almost anywhere on the islands.

Private work on forests is within the immediate control of individuals and corporations, but public work of this kind requires legislative appropriation.

### REFORESTING APPROPRIATIONS NEEDED.

Up to the present time the Hawaiian Legislature has contented itself with appropriations for forest purposes barely sufficient to maintain a skeleton organization, without sufficient funds to take up the active work of reforestation.

To obtain appropriations for this purpose requires a public enlightenment and support from that portion of the community which recognizes the necessity of the situation.

There is no organization in the Territory which compares with the Planters' Association in power to bring to bear upon the legislature intelligent public opinion and influence.

I submit that not only should the Association pass resolutions to be presented to the legislature, in support of appropriations for reforestation, but that in their own interests, individual members should use their private influence in support of such a policy.

### MEN AND METHODS ARE AVAILABLE.

The methods of propagation of tree seeds and of the young trees has been studied out and we are supplied with men who know just how it is to be done.

One of the ablest of these, Mr. Hawes, of the local Government Forestry Service, an educated forester, has spent the last twenty years of his life in studying the subject and his services are now available free to everyone, private, individual or corporation, who wishes the benefit of his advice on the ground as to what to do and how to do it.

All that is lacking is the desire to act and the carrying of the desire into effect.

## SECOND. THE LUMBERING POLICY OF THE TERRITORY ON WATERSHED AS DISTINGUISHED FROM NON-WATERSHED FOREST AREAS.

The government owns a large area of forest land back of the Hilo District.

This forest contains large quantities of both Ohia and Koa timber.

This forest also is located upon one of the principal watersheds of the Territory, the entire town and District of Hilo obtaining their water supply from this source.

Early this year an application was made to the government for permission to cut timber from this forest.

The fact that, with the approval of the Superintendent and Board of Forestry, lumbering on a considerable scale in the Kau and Kona Districts of Hawaii had recently been approved, gave much concern to those interested in the Hilo water supply, for fear that consistency might require a like approval of lumbering in the Hilo District.

The Territorial Superintendent of Forestry, Mr. Hosmer, made an exhaustive study of the situation, and a report thereon to the Board of Forestry, recommending that the request be denied. The Board of Forestry adopted the reasoning and the recommendation of the report, and the Land Commissioner and Governor of the Territory have approved of the recommendation of the Board.

## FOUNDATION PRINCIPLES INVOLVED.

I consider that the principles involved in the differentiation between the Hilo forest on the one hand, and the Kau and Kona forests on the other, lie at the foundation of the forestry question in this Territory, and, that if the policy as outlined in connection with this particular case can be established as the continuing policy of the Territory, it will far more than justify all the expense which the Forestry Department of the Government has heretofore caused, and be added cause for congratulation that the Territory has been so fortunate as to secure at the head of its Forestry Department an educated forester, representing the most advanced study and intelligence concerning the subject available in the United States.

Although the Forestry Department in Hawaii has not, as yet, much to show in the way of material returns, it is of immense advantage to the people of this Territory to have the principles upon which they should proceed, intelligently studied out on the ground and clearly expressed, so that the lay man may understand why it is good economy to lumber one section of the island forests and not to do so in another.

### THE FACTS INVOLVED.

Mr. Hosmer's report brings out the line of demarcation between the watershed and the non-watershed territory so clearly, that all that needs to be further said in this connection is to make a few quotations from his report.

After describing the nature of the forested area, Mr. Hosmer says:

"All over the area are springs, pools and swamps that feed the various small tributaries to the Wailuku river and its several branches. Practically the whole drainage basin of this stream is on this land. \* \* \* Very little is known accurately of the actual sources of the water in the streams or from which part of the forest they are most largely fed; but the indications are that from one-third to one-half of the water comes from the area of pure Ohia forest, while the remainder is the result of springs and swamps lower down. These springs are dependent for their sustained and equalized flow on the protection afforded by the forest cover. \* \* \*

"Having given the problem thorough and careful study, both on the ground and in its various relations, I cannot report favorably on the proposition to lumber this tract.

"My principal reasons for this decision are three in number.

### PROTECTION OF WATER FLOW.

"FIRST: I BELIEVE THE GREATEST VALUE OF THE FOREST ON PIIHONUA TO BE IN THE INFLUENCE WHICH IT HAS ON THE BRANCH OF THE WAILUKU RIVER AND ITS BRANCHES, I. E., ON THE EFFECT THE FOREST EXERTS ON THE WATER AFTER IT REACHES THE SURFACE, BY EQUALIZING THE FLOW AND PREVENTING EXCESSIVE RUN OFF.

"In view of use and possible further development for water power, irrigation and even for domestic supply—especially in connection with the growth of Hilo town—I regard the Wailuku as one of, if not, the most important stream protected by a forest reserve in the Territory.

"It might be possible, if the work were done under careful restrictions, to remove some of the mature trees from the Piihonua forest without detriment to its water conserving qualities; but to make lumbering profitable the operations would have to be conducted on a large scale. This would inevitably involve the opening up of considerable areas in sections where A COMPLETE FOREST COVER IS MOST NEEDED. Such a policy on this particular watershed would be fraught with danger. It is a risk which I do not believe the Territory should take; for the money to be obtained as stumpage would in no way compensate for the injury that would result were the regular flow of the Wailuku river seriously interfered with. \* \* \*

### UTILIZATION OF TIMBER.

"Second: The forest policy of the Territory has been, and is, to create a chain of forest reserves that are essentially 'protection forests.'

"ON THE LEEWARD SIDE OF THE ISLAND, WHERE, BECAUSE OF THE ABSENCE OF RUNNING STREAMS WATERSHED PROTECTION DOES NOT FIGURE, I AM IN FAVOR OF UTILIZING THE MERCHANTABLE TIMBER. BUT ON THE WINDWARD SIDE OF HAWAII I BELIEVE THAT THE FOREST IN THE SEVERAL ESTABLISHED FOREST RESERVES, SHOULD, FOR THE MOST PART, BE KEPT INTACT, AT ANY RATE FOR THE PRESENT. \* \* \*

"Third: My third reason is from a professional standpoint.

"Forestry rests on a business as well as on a scientific basis.

"In the consideration of such a problem as the lumbering of the Piihonua forest, the factor of whether or not it would pay is an essential one.

"Even were it desirable that lumbering should be permitted, it would, in my judgment, be necessary, in order to safeguard the favorable conditions of stream flow that now exist, to load the contract with stringent regulations as to the area to be logged, the methods to be used and the subsequent treatment of the tract."

Mr. Hosmer concludes that in the instance under consideration these regulations would leave no margin of profit for the contractor, and that, therefore it would be unjustifiable to recommend foresting under conditions which could not result in profit.

## THE IMPORTANT FEATURE.

THE IMPORTANT FEATURE IN THE POLICY EMPHASIZED BY THE FOREGOING REPORT IS THE RADICAL DIFFERENCE BETWEEN THE FORESTS WHICH ACT AS A REGULATOR OF THE FLOW OF WATER AND FORESTS FROM WHICH THERE IS NO WATER FLOW.

Whether forests affect climate, especially rainfall, or not, is a disputed point.

My personal belief, based on personal knowledge of a large part of this Territory, is that it does have a strong effect thereon in many parts of this Territory.

There is, however, no dispute, and can be no dispute that a thick forest cover not only helps, but is absolutely essential to the maintenance of an even flow of water from a given water producing area.

I go further and claim that a forest on a water producing area in this Territory, with its heavy rainfalls and short watersheds, is absolutely essential to any economical flow of water at all.

## HAWAIIAN WATERSHEDS ARE SHORT.

The Hawaiian streams, which furnish water for irrigation and other economic use, all rise in forest areas with watersheds of from five or six to less than thirty miles in length.

It requires no scientific study or reasoning to demonstrate that water flowing upon an area of land averaging not over 12 to 15 miles in length and on a grade of from 5 to 50 per cent., will not hold water for more than a few hours after rainfall has ceased, unless there is not only a forest, but a thick jungle of ferns, moss and debris to prevent its rushing in a torrent to the sea.

The forest is not enough under such circumstances. There must be a subsidiary growth of small trees and shrubs; under that a growth of ferns and creeping vines and in addition to that an undisturbed matting of leaves, sticks and moss creating a mass of material so thick as to hamper and almost prevent the flow of water. Once a clearing is made sufficient for the water to wear a course for itself and the heavy torrential rains, with the steep grade, will cut innumerable water courses to the sea, denuding the land of soil and draining off the water supply.

The almost constant standing water and semi-swampy condition existing in Hawaiian water-producing forests is essential to the very existence of this character of forest, as the existence of this character of forest is necessary to the con-



servation of the water supply. Neither can exist without the other.

Under these circumstances, any radical interference whatsoever with any portion of the forest immediately sets in motion a train of events which eventually destroys the whole.

In other words, it is my firm conviction, based upon fairly close observation extending over the last thirty-five years, that the forest growth on the water-producing watersheds of Hawaii must be, as far as possible, absolutely closed to interference, either by man or beast, or the result will be, in spite of all effort to the contrary, a doubly reacting disintegration of the forest, and diminution and final destruction of the area as an economic water-producing source.

### NON-WATER PRODUCING FORESTS.

In marked contrast to this, as brought out by Mr. Hosmer's report, is the Hawaiian forest which does not cover a water-producing area.

Here there is no water flow to complicate the question.

There is not only no water to conserve, but the natural growth of the forest, being more open, does not require the careful protection which the forest growing in a semi-swamp does. The undergrowth is hardier and recovers more easily than it does in the water-soaked section.

With proper care, the mature trees can be removed, not only without radical damage to the remaining growth, but to the advantage of the younger growth; and by opening up the under vegetation, gives opportunity for seeds to start and saplings to reach the light, which otherwise would fail to germinate or die for lack of room.

It becomes simply a question of intelligent lumbering; the making of the forest a revenue-producer through the medium of lumber instead of through the medium of water.

The principle involved in both cases is the same, viz: the causing the soil to produce that which will be the most value to mankind. In the water-producing area that which can be produced of most value is water. In the non-water producing forest that which can be produced of most value is timber.

How to intelligently lumber forests, is a question which has had expert study of a high class in most European countries and to which great attention is now being paid in the United States. There is no mystery about it. It simply consists in intelligent application of common sense to local conditions. This has been done in Europe and is being done in the United States. It has practically never yet been done in Hawaii.

## WHAT FOREST RESERVES MEAN,

Popular opinion in Hawaii largely conceives of a forest reserve, as an area which is locked up and removed from profitable enterprise.

As a matter of fact, in the case of water-producing forest, it is a devoting of the land to the production of that which is of the most value to the people of the Territory, viz: water.

In the case of non-water producing forest, it means, not locking up from profitable use, but protecting the forest from destructive agencies, so that it can be made profitable, which now it is not, and, with a few exceptions, never has been; and, unless the methods of lumbering and reproduction evolved by study in Europe and the United States are applied here, never will be.

In other words, the most valuable crop which can be produced in a water bearing forest, is water. The most valuable crop which can be produced in a non-water producing forest, is timber. Whatever will most effectively accomplish these results in the respective cases, is in the public, as well as private interest, and should be done.

## THE MAHOGANY LUMBER COMPANY.

(3). THIS NATURALLY BRINGS US TO THE CONSIDERATION OF THE EXTENSIVE OPERATIONS NOW BEING UNDERTAKEN, BY THE HAWAIIAN MAHOGANY LUMBER COMPANY.

The proposition that Hawaii possesses forests which can produce railroad ties by the million, has come as an intense surprise to all but a very few in Hawaii.

The fact that ties can be produced and exported at a profit has come as a surprise to everyone. The only possible explanation thereof is the practical lumber famine which is now upon the United States and so graphically described in the official reports above quoted from. This shortage has for the first time made it possible to bring home to the people of Hawaii, in cold dollars and cents, that forest production and lumbering can be made an important industry in this Territory.

The fact that nearly three million standard railroad ties are to be exported from the Territory within the next five years has produced much solicitude and adverse comment among those who have not studied the question. Within the past month I have repeatedly heard the statement made that this contract was a bad thing for the Territory as it would not only denude the forest but exhaust the entire local supply of timber.

## WHERE THE TIMBER WILL COME FROM.

So far from this being the case, the fact is that almost this entire contract will be filled with timber cut from the arable lands of the Olaa and Puna Sugar Companies, which, in ordinary process, they are clearing for the cultivation of sugar cane.

Heretofore the timber cleared from similar lands has been removed at large expense and burned on the ground to get rid of it.

Under this contract the timber will be removed at no expense to the plantations and a handsome stumpage will be paid to them instead.

Just how much more Ohia there is available for lumbering cannot now be definitely stated, without much more careful examination than has heretofore been given to the subject, but it is entirely conservative to say that there is ten times as much more available Ohia as that involved in this contract without in any way interfering with water conserving forests.

Comparatively little of the Ohia forest available for lumbering is suitable for cultivation. The great bulk of it is on land so rocky or so steep, or at such elevations as to make agriculture impracticable for any products now known to be profitable.

In consequence of this fact the great bulk of the Ohia forest land will continue to be forest land. Whether they will continue to produce only Ohia timber is a question which the future must determine, after intelligent study by forestry experts has been given to the subject. It may very well be that it will pay to substitute the slow growing Ohia tree, as the mature Ohia forest is removed, with the quicker growing hardwood trees which are so easily propagated here.

## NO FEAR OF FOREST DESTRUCTION.

The people of Hawaii need have no fear that the present move to make valuable the heretofore waste forests of Hawaii, is a move toward denudation of the forest and the carrying on of the policy of forest destruction which has heretofore prevailed so generally.

The one railroad tie contract above referred to means that there will, within the next five years, be brought into this Territory approximately two and one-half million dollars in gold coin which, but for that contract, would never have come here.

It means that this contract will demonstrate that lumber production can be made one of our leading industries. This is with the proviso, however, that such lumbering is done under intelligent supervision and is followed up by intelligent

care of the area lumbered, looking toward the protection of the young trees remaining and the propagation of additional trees.

The outlook is full of hope in this connection, for the operations of the Mahogany Lumber Company, not only in connection with its lumbering of Ohia ties, but of the Koa forests, is being consistently carried out, both on the part of the forest owners and of the lumbering company, under the direct supervision and advice of the Superintendent of Forestry and subject to the rules and regulations of the Board of Forestry.

## THE RUBBER INDUSTRY.

### (4). THE RUBBER INDUSTRY AS RELATED TO FORESTRY.

Systematic rubber planting in Hawaii as an industry was begun three years ago, but until this year there have been no systematic tapping of trees and keeping of statistics of yield, on which to base commercial calculations of the profitableness or otherwise of the business.

During the past year under the direction of Jared Smith, chief of the Federal Agricultural Experiment Station in Hawaii, a number of mature rubber trees growing in the Territory have been tapped and statistics kept of the yield. The results are not yet available for publication but sufficient has been learned to make it certain that rubber production will be profitable in this Territory under existing conditions.

This fact has been accepted to the extent that there are already five incorporated companies planting rubber on a considerable scale, besides a large number of individuals planting on a small scale. There have already been planted in the Territory between five and six hundred thousand rubber trees. The first tapping on any scale will take place next summer.

### FORESTRY AND THE PLANTERS' ASSOCIATION.

From the standpoint of a profitable industry there is great hope in rubber, especially as, although the trees require good soil, they can be grown to advantage in patches scattered through the many small valleys which are found in all the mountain sections of the Territory. The business will therefore not only be of value in creating a new profitable industry, but will incidentally assist in reforesting the islands, especially where, by reason of inaccessible or smallness of area, it probably would never pay to plant for lumbering purposes.

Intelligent advice should be sought as to where and when to plant rubber trees, as they will not grow well at either the

elevations or under rainfall conditions where many other trees will do finely.

There are unquestionably, however, large areas which are unfit for general cultivation, which should be reforested, and where rubber trees will do as well, and be more profitable, than any other tree which can be planted there.

The local Federal Agricultural Station has issued bulletins upon the subject of rubber culture and is about to issue another one.

The Territorial Agricultural Forestry Department has also interested itself in the matter; is furnishing rubber seed at approximately cost to all who desire it, and is prepared to give expert advice and suggestions as to locations and methods of planting.

### RUBBER AS INCIDENTAL TO SUGAR.

There is no reason why, incidentally, a number of sugar plantations, especially those in the non-irrigated windward districts, should not, at slight expense, plant large numbers of rubber trees in gulches and other localities unsuitable for cane, resulting in a benefit by present reforestation; and ultimate profit from the rubber product which, if present prices prevail and the expectations of those who have made a study of rubber are fulfilled, will eventually, be greater per acre than is even sugar.

The concrete results of next year's tapping of the trees at Nahiku will be watched with eager interest by all interested in the development of Hawaii.

### RUBBER AS A REFORESTING AGENT.

Altogether 1907 has been a memorable year in the history of forestry and forest products in Hawaii. Whether the events of the year shall be taken to heart and made available for the beneficial progress of the Territory, either through the medium of public or private enterprise, depends largely upon the intelligence and energy of the members of this Association.

In the past the subject of forestry has been largely treated by this Association as an interesting incident, but not as one of direct concern or of possible immediate benefit or profit to its members. Within two years I have heard of trees bounding fields being cut out because the shade injured the adjoining cane.

In all earnestness I urge upon the Association that the time for this view of forestry and its possibilities in Hawaii has past, and that the preservation, propagation and utilizing of

forests and forest products should from this time forth be made one of the leading features of the efforts of the Planters' Association, both by it as an organization, and through the individuals and corporations which give it its strength.

Respectfully submitted,

LORRIN A. THURSTON,  
Committee on Forestry.

---

*NEW FRUIT MARKETS.*

---

The following letter by Mr. Jared Smith, is copied from a recent Advertiser:

Editor Advertiser: Mr. J. E. Higgins reports, under date of September 4, 1907, the arrival in Chicago in perfect condition, of our pineapples and avocados. This carload of fruit left Honolulu per Alameda, August 14, and arrived in Chicago late Saturday afternoon, August 31. The following Monday being Labor Day, the fruit was not opened for examination until September 3. Mr. Higgins states that out of the whole lot of pineapples sent, he had discovered, so far, only one defective fruit. A consignment of twenty-two dozen avocados which accompanied the pineapples, arrived in Chicago in good condition for immediate use.

This is a practical demonstration of the fact that pineapples and alligator pears can be shipped in good condition to any market which can be reached from Honolulu in twenty-one days, either by ocean or rail transportation. With the present lines of communication, this would include all mainland points between San Francisco and Chicago, all northern ports as far as Sitka, all Japanese ports, Vladivostok, Hongkong, Sydney and Melbourne. Those who engage in the pineapple industry in Hawaii need have no fear of producing a larger crop than can be marketed at present prices for many years to come.

Yours truly,

JARED G. SMITH,  
Special Agent in Charge.

Hawaii Agricultural Experiment Station, Honolulu, Sept. 19, 1907.

# BOARD OF AGRICULTURE AND FORESTRY.

## Division of Forestry.

### ROUTINE REPORTS.

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Board of Commissioners of  
Agriculture and Forestry,  
Honolulu.

October 30, 1907.

Gentlemen:—

I have the honor to submit the following report covering the routine work of the Division of Forestry from July 29, 1907, to date.

During this period my own time has been taken up as follows: The first part of August was devoted to various routine matters connected with the work of the Division. Practically all of the time since August 20 I have been in the field, on trips to the other islands having to do with forest reserve projects, forest inspection and examinations of forest lands belonging to private corporations and individuals; the last under the offer contained in Circular No. 1 of this Division, wherein the Division agrees to give advice and assistance to owners of forest land in the management of their properties, according to the methods of forestry.

#### MAUI.

From August 20th to 31st I was on Maui, making an examination of the forest planting now going on on the lands of the Alexander and Baldwin interests, in several localities near Haiku; in an inspection of a portion of the proposed Makawao Forest Reserve, where there is a question of forest planting; in a visit to the rubber plantations at Nahiku; and in an examination of certain problems in the Koolau Forest Reserve. At Nahiku I saw in some detail the groves of the several plantations and discussed with the different managers various matters in connection with rubber growing.

#### *Rubber at Nahiku.*

So far as the growth of the trees goes the outlook at Nahiku is most promising and from all present indications a satisfactory yield of latex seems assured. The problems of finding the best method of tapping and harvesting the rubber, involving as they do the training of skilled workmen, now loom large, but I am

confident that a satisfactory solution will be found when the matter receives careful attention. With the trees growing at the present rate it will not be long before the older groves will be large enough to permit systematic experiments to be begun.

#### MOLOKAI.

Returning to Honolulu for a few days I was again away from September 3rd to September 8th on a trip to Molokai. This, my first visit to that island, gave me the opportunity to inspect the private forest reserve that has for a number of years been maintained on the central mountain of Molokai by the American Sugar Company; to investigate the question of the best method of handling the Algaroba forest to meet the varying demands of honey production, stock feed and utilization for fuel; and in general to get in touch with the conditions existing on the western half of that interesting island.

#### KONA, HAWAII.

On September 10th I started on the trip from which I have just returned. Going first to the Kona District on Hawaii I made as thorough an inspection of the forested area from Mt. Hualalai to the Kau District line as is possible, without the cutting of numerous and expensive trails through the forest. Using existing trails through the woods as a basis I made a general examination of the forest as a whole; including both government and private forest lands.

On this basis I am prepared to make recommendations for the government land, as well as to the several owners, as to methods of managing this area, in accordance with the principles of forestry. Such reports are now in preparation; they will later be brought to the attention of the Board.

#### *The Forest Question in Kona.*

In this connection it seems to me appropriate to repeat the statement, made in former reports of mine, that the forest question in this Territory has two very distinct aspects. On the windward side of the islands, especially Hawaii and Maui, in districts where there is living water in springs, brooks or streams that is either made use of locally, or impounded for the irrigation of lands more or less near at hand, the forest is mainly important as a protective cover, and as such should be kept as nearly intact as may be. On the leeward side of the islands, on the other hand, where the only living water is found in occasional springs, a different treatment is indicated. Here the forest, excepting always such areas as may be necessary to protect the liv-



ing water that does exist, is and ought to be considered in relation to its commercial value.

So in the Kona District, having carefully studied the situation on the ground, I am in favor of lumbering the mature trees, both Koa and Ohia, for I believe that if the work in the woods is properly done and the areas cut over are handled subsequently in an intelligent way, not only will a valuable industry be added to the Territory, but also that the forests themselves will be in better condition than at present.

Over considerable areas in Kona the large Koa trees are dying and in a few years will cease to have value either as a forest cover or as commercially important wood. The wise thing is to utilize this material while we may and then to manage the land on which it grew for the purpose for which it is best adapted. Some of the land now nominally under forest is unquestionably of greater value for grazing. Part of it can best be used for growing trees. The problem presented is to put it all to its best use, with due regard not only to strictly utilitarian use, but also to the indirect benefits which may result to the district from having a considerable body of forest on its mountain slopes. These points will be brought out in detail in my reports on the Kona lands.

#### *Experimental Tree Planting.*

Following my visit to Kona I spent three days at Waimea, selecting on the slope of Mauna Kea, several plots where can be carried on the coöperative tree planting experiments for which the U. S. Forest Service has recently supplied the funds. The areas selected are five acre plots on the unleased government land of Kaohe, at elevations of respectively 7,500, 9,000 and 11,000 feet. Here it is proposed to plant pines, spruces and firs from the temperate zone, with the expectation of finding a valuable tree that will grow on the higher slopes of our mountains, above the native forest. Similar experimental plots were also selected on the slope of Mt. Haleakala on Maui, as a part of my work on that island.

#### MAUI.

On October 4th I went over to Maui, remaining on that island till my return to Honolulu on October 24th. My visit to Maui consisted in a careful examination of the forest question in the Districts of Kula, Honouaulea, Kahikinui and Kaupo, particularly in relation to government lands that are unleased or on which the leases will soon expire; in matters connected with the protection by a forest cover of the area adjoining the Waihou Spring on the government land of Makawao (Haleakala Tract); in the selection mentioned above of areas for experimental tree planting; and in an inspection of the tree planting work now being carried on by the Haleakala Ranch. Taking advantage of being

within easy reach I attended the Rubber Growers' meeting at Nahiku on October 12th, visiting some additional groves that I had not seen on my earlier trip and taking a part in the establishment of the Hawaiian Rubber Growers' Association. On the several questions investigated on Maui I shall in due course submit detailed reports to the Board.

#### ROUTINE MATTERS.

During the past three months the most important routine work in the Division of Forestry has been the exchange of seed with botanical gardens and other corporations and individuals in various parts of the world. Seed of many valuable trees and plants, new to the islands, have been received and are now being propagated in the Nursery.

Perhaps of the greatest present interest are two new species of rubber trees from Brazil, sent from Germany. They both belong to the genus *Manihot*, of which the Ceara rubber, so well known locally, has heretofore been considered the only rubber-producing species. Plants have been started at the Nursery and sent to Nahiku for trial. As is usual at this season of the year many trees and plants have recently been furnished to the schools for Arbor Day planting.

#### *Nursery Grounds.*

Thanks to the Superintendent of Public Works the work of improving the Government Nursery grounds is progressing favorably. Over 900 yards of earth have been hauled in to fill up the low lying part of the grounds and additional lots are daily being added. When the present improvements are completed the grounds will be in a more satisfactory condition than at any time in their history.

The new laboratory of the Division of Animal Industry was completed in September, and is now ready for occupancy.

#### *Meetings.*

The library room of the Board continues to be used for evening meetings of various organizations. Since July 29th the list is as follows:

Hawaiian Entomological Society, August 8th.  
Hawaiian Poultry Association, September 10th.  
Kaimuki-Palolo Improvement Club, October 25th.  
Hawaiian Entomological Society, October 3rd.

Very respectfully,

RALPH S. HOSMER,  
Superintendent of Forestry.

REPORT OF HORTICULTURAL-QUARANTINE INSPECTION WORK.

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Honolulu, October 30, 1907.

To the Honorable Board of  
Commissioners of Agriculture and Forestry,  
Honolulu, T. H.  
Gentlemen:—

Since my report to you, dated the 2nd instant, there have arrived twenty-five steam and sailing vessels from outside the Territory requiring inspection by this Department.

On October 3rd the S. S. "Hilonian" arrived from San Francisco and on board were found four crates of turnips infested with the larvae and pupae of the raddish-cabbage root maggot (*Phorbia brassicae*). These vegetables, including the cases, were destroyed by fire.

On the 7th of October the S. S. "Sierra" brought from San Francisco five cases of quince badly infested with codling moth larvae (*Carpocapsa pomonella*). This is not a new pest for that fruit but, as the quantity of worms found made the fruit practically worthless, the consignment was burned.

On October 11th the S. S. "Nippon Maru" brought 110 packages of rubber seeds, some of which had been damaged and were found to be swarming with a species of mite. The seeds were treated with the fumes of carbon bisulphide. Mites, as a rule, are difficult to destroy, but with the above chemical these succumbed readily in the course of an exposure of about two hours. The same chemical was again used in the disinfection of some infested imported Japanese rice.

Consignments of lemons and other fruits from Australia were ordered sent out of the Territory on account of the danger of introducing the fruit flies of that country.

Since my last report I have received an interesting letter from Mr. Geo. Compere, who is at present in India collecting beneficial insects for Western Australia and California. Mr. Compere has again succeeded in securing parasites upon fruit maggots, one species of which pest was introduced in the Territory some years ago, and has since practically wiped out the formerly profitable melon crops of these islands. Among the parasites secured by Mr. Compere, and being bred in India by him for introduction into West Australia, is one on cucumber, which will no doubt be beneficial to us here when introduced and established. Mr. Compere is meeting with many difficulties owing to distance in transportation, but states that he will this time be successful

in introducing these parasites into Western Australia, after which, in course of time, it will be easy for us to get them from the latter country.

This department has made another inspection of the young mango trees that have been propagated from imported Indian mango varieties, and has found them free from the "mango scale" (*Coccus mangiferae*) about which I previously reported. This is very satisfactory and it is hoped that parties who have purchased, or have been presented with trees of the above varieties, will notify the department so that we may make a free inspection of these and disinfect them if necessary.

Respectfully submitted,

ALEXANDER CRAW,

Superintendent of Entomology and Inspector.

# NOTES FROM THE REPORTS OF THE FOREST NURSERYMAN.

(October 2 and 30, 1907.)

## PROPAGATION AND DISTRIBUTION OF PLANTS.

Owing to the large amount of seed which we are receiving in exchange for seed sent out some time ago, a large number of plants new to the Territory are being experimented with. The propagating house although small, is of great service in this work and it is kept full all the time. The demand for forest trees is increasing and a number of people have been making inquiries regarding the best trees to plant, methods of planting, etc. A number of orders are on file for large quantities of forest trees. Those are mostly from people in the neighborhood of Honolulu, and on this island. People on the other islands who want to do much planting are advised to grow their own trees; all instructions in propagating and planting being given and seed supplied at cost of collecting.

## COLLECTING AND EXCHANGE OF SEED.

The collecting of seed has been continued. Our seed exchange list now numbers over 100 Botanic Gardens and other Institutions. The correspondence in connection with this work is taking up much of the writer's time. The demand for seed of the indigenous plants of the islands by the different Botanic Gardens is large. We are trying to get together all the native seed of

any consequence to be used for exchange purposes. Seed has been received as follows in exchange for seed sent out by us some time ago:

3 packages from Yokohama Nursery Co., Yokohama, Japan.		
31	"	" Botanic Gardens, Hobart, Tasmania.
32	"	" Botanic Gardens, Melbourne.
11	"	" Botanic Gardens, Mysore, India.
14	"	" Public Grounds & Plantation, Jamaica.
19	"	" Public Works, Island of Guam.
2	"	" Royal Botanic Gardens, Berlin, Germany.
177	"	" Royal Botanic Gardens, Calcutta.
67	"	" J. Staer, Seedsman, Wahronga, Australia.
27	"	" Botanic Gardens, Straits Settlements.
37	"	" Royal Botanic Gardens, Ceylon.
1	"	" T. F. Sedgwick, Lima, Peru.
77	"	" Botanic Gardens, Saharnpur, India.
4	"	" Botanic Gardens, Aburi, Accra Gold Coast.
120	"	" Botanic Gardens, Buitenzorg, Java.
8	"	" Botanic Station, Uganda, British East Africa.

The most important consignment of seed received so far consists of two new varieties of the rubber-bearing *Manihot*, sent from the Royal Botanic Garden at Dahlem, near Berlin, Germany. In a letter from the Director, received Sept. 3, 1907, he has the following to say regarding the seed: "I beg to send with this the seed of two species of *Manihot* from the State of Bahia, Brazil. For the present one of these may be designated as *Manihot* from Jejuie, the other *Manihot* from Piauhy. Both are new species that should be immediately described under their scientific, botanical names. Both produce rubber." Previous to this introduction we have only had one species of rubber-bearing *Manihot*, namely *Manihot glaziovii* (Ceara rubber). Both new kinds have been started in the propagating house and are making a vigorous growth.

#### ADVICE AND ASSISTANCE.

A report with planting plan has been completed for the Hawaiian Fibre Co., Mr. Wm. Weinrich, Manager, for the land of Lower Pauhala, in Waikele, Ewa, Oahu. The whole tract contains approximately 2,000 acres and the land to be planted in trees about 400 acres.

#### WEED EXTERMINATOR.

A mixture of six pounds of white arsenic, five pounds of caustic soda and one gallon of water, is recommended for keeping street gutters and car lines free from weeds.

*FOREST NOTES OF OTHER COUNTRIES.*

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*From Practical Forestry.*

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In France, at Perigord, oak forests are planted for the truffles which grow upon their roots. It is said that three million dollars' worth of the fungus is annually exported.

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In Italy acres of olive, walnut, willow and mulberry trees are grown in the fields, between which grain and potatoes are planted. The trees are pollarded and serve as props to grapes vines. The willow twigs are used to tie up the vines and the mulberry leaves furnish food for silkworms.

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In Mexico rubber is grown as a shade to coffee.

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Saxony, in Germany, with a population of three and a half millions and an area of nearly six thousand square miles, devotes more than a quarter of its land to productive forestry. The tree most grown there is spruce.

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The swampy lands of Gascony were practically reclaimed by tree culture which added a new province to France.

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In many countries of Europe willow trees are grown along the innumerable streams and ditches, and do double duty. The roots are useful to bind the banks and prevent the incroachment of the water, while the branches yield withes for basketry and the wood is used for sabots.

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*ARBOR DAY PROCLAMATION.*

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In accordance with custom, I hereby designate Friday, the 15th day of November, 1907, as Arbor Day for the Territory of Hawaii, and recommend that on that day appropriate exercises be held in all the schools of the Territory and that a part of the day be devoted to the planting of trees and shrubs.

Given under my hand and the Great Seal of the Territory of Hawaii at the Capitol, in Honolulu, this 31st day of October, A. D. 1907.

(Seal)

W. F. FREAR,  
Governor of Hawaii.

By the Governor:

E. A. MOTT-SMITH,  
Secretary of Hawaii.

## NEW PUBLICATIONS.

## FARMERS' BULLETIN 287.

Poultry Management. By G. Arthur Bell, Assistant Animal Husbandman, Bureau of Animal Industry. Pp. 48, figs. 14.

This bulletin deals with chicken raising, containing suggestions and directions for construction of poultry houses, selection of breeds, treatment and care of chicks and capons, remedies for diseases and bad habits of the fowls, methods of preserving eggs, etc. It is designed to supersede Farmers' Bulletins 41 and 141, entitled "Fowls: Care and Feeding" and "Poultry Raising on the Farm," respectively.

## FARMERS' BULLETIN 298.

Food Value of Corn and Corn Products. By Charles D. Woods, Director, Maine Agricultural Experiment Station. Pp. 40, figs. 2.

History of the maize plant, with studies on the digestibility and food value of this cereal in its various uses. Corn breakfast foods, pop corn and green corn receive attention, and the use of raw corn and parched corn are considered. Milling and cooking are also features of the bulletin.

## FARMERS' BULLETIN 304.

Growing and Curing Hops. By W. W. Stockberger, Expert, Drug-plant Investigations, Bureau of Plant Industry. Pp. 39, figs. 20.

This Bulletin gives the climatic and soil conditions essential to successful hop growing, directions for propagation, cultivation, pruning, training, picking, curing, and baling, with a statement as to cost and yield of crop, and suggestions for marketing.

## FARMERS' BULLETIN 306,

Dodder in Relation to Farm Seeds. By F. H. Hillman, Assistant Botanist, Bureau of Plant Industry. Pp. 27, figs. 10.

Character and varieties of the dodder plant, its preference for certain host plants, kinds of seeds infested, relation to seed trade, directions for detection, description and illustrations of seed, buying and cleaning of clover and alfalfa seeds, detection and destruction of plants in the field, etc.

## FARMERS' BULLETIN 308.

Game Laws for 1907. A Summary of the Provisions Relating to Seasons, Shipment, Sale, and Licenses. By T. S. Palmer, Henry Oldys, and Chas. E. Brewster, Assistants Biological Survey. Pp. 52, figs. 4.

## PUBLICATIONS, BUREAU OF ANIMAL INDUSTRY.

## CIRCULAR 24.

The Man Who Works with His Hands. Address of President Roosevelt at the Semi-Centennial Celebration of the Founding of Agricultural Colleges in the United States, at Lansing, Mich., May 31, 1907. Pp. 14.

## CIRCULAR 112.

Relative Proportions of the Sexes in Litters of Pigs. By George M. Rommel, Animal Husbandman. P. 1.

## CIRCULAR 113.

Classification of American Carriage Horses. Pp. 4.

*AGRICULTURAL NOTES.*

## HERD OF BULLS.

The finest herd of blooded cattle that has ever been imported to Hawaii was brought by a recent Hilonian. The herd consists of thirty-three bulls consigned to the Parker Ranch, the American Sugar Company Ranch and to John Hind. The animals were selected by Mr. Fred. L. Carter and consist of purebred Herefords, Shorthorns and Devons.

## POULTRY SHOW.

The Farmers' Institute of Hawaii will again unite with the Hawaiian Poultry Breeders' Association in making a general agricultural exhibition in connection with the December Poultry Show. It is hoped that Forester readers will assist in the success of this enterprise by contributing exhibits of fruits, flowers, vegetables, poultry and other produce.

## THE ALGAROBA.

The great value of the algaroba is illustrated by the condition of a tract of land between Kihei and Maalaea Bay. Maui, which some years ago was so sterile as to be valueless. Application has now been made for its opening to settlement by a number of native Hawaiians, who wish to devote it to agricultural purposes. The improvement in the land is solely due to a growth of algaroba with which it has become covered.

## WEED KILLER.

Application for patenting an invention which should prove of great value to sugar planters has lately been made by Mr. T. J.



Ryan of Hawaii. The proposed machine is intended to burn away weeds by means of a series of burners operating below the body of the apparatus.

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#### PINEAPPLE EXPORT.

The largest shipment of canned pineapples ever made from this Territory was dispatched on the Hilonian which left Honolulu on November 6th with 20,300 cases. The total value of the consignment was about \$80,000, and it is confidently predicted by growers that within the next few seasons shipments of this size will be frequent.

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#### REFINED SUGAR.

The manufacture of refined sugar upon the plantations is gaining in popularity. The practice has lately been adopted at Aiea which has produced a most excellent article from its new refinery.

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#### TAPIOCA.

Mr. J. W. Conradt is reported to be about to establish a small factory in Hamakua for the manufacture of tapioca starch. It is intended to construct a small mill capable of producing one ton of tapioca a day. Tapioca starch is by many preferred to corn starch for culinary purposes and is also of great value in the laundry.

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#### HONOLULU ENTERPRISE.

The Honolulu Iron Works has for some time been engaged in the manufacture of three complete sugar mills for operation in Formosa. The first of these is already nearly installed, and will be ready for operation early next year. The new plant has a capacity of 65 tons of sugar per diem and is complete in every detail. The remaining plants will have capacities of 150 and 120 tons of sugar daily, respectively.

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#### CATTLE.

The supply of cattle upon the various island ranches is said to be in excess of the present market demand.

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#### RAILWAY EXTENSION.

The Kona Agricultural Company, the Kona Development Company and the West Hawaiian Railway Company have together authorized an issue of \$1,000,000 of bonds for the purpose of railroad extension. The road will be used for the conveyance of passengers and freight and also for transporting sugar cane to the mill of the Kona Development Company. Thirty-two miles of track are already in operation and the new extension, which will permit seaport connection at Kealahou Bay, will greatly extend the possibilities of the development of North and South Kona.

The Forest Service has just issued a publication entitled "The Strength of Wood as Influenced by Moisture," in which are shown the strength of representative woods in all the degrees of moisture from the green state to absolute dryness, and the effects of re-soaking. This publication will be sent free upon application to the Forest Service, U. S. Department of Agriculture, Washington, D. C.

#### THE INTRODUCTION OF TOP MINNOWS INTO THE HAWAIIAN ISLANDS.

This publication comprises Press Bulletin No. 20 of the Hawaii Agricultural Station, and is written by D. L. Van Dine, Entomologist of the Station. It gives concisely an account of the successful introduction to Hawaii of the Top Minnows, the natural enemies of the mosquitoes and of their establishment in our waters.

#### MARKETING HAWAIIAN FRUITS.

Under the above title Mr. J. E. Higgins, Horticulturist of the Hawaii Agricultural Experiment Station, contributes Bulletin No. 14 to the publication of the local station.

For many years heavy losses have been entailed by shipping fruits to the mainland. These losses have so greatly increased of late that there has been a general tendency to can the greater part of the crop and some companies have entirely abandoned shipping fresh fruits to the coast.

An experiment was undertaken by the station in shipping Hawaiian fruits packed in different methods, treated in various ways, and subjected to the same conditions as other fruits in transit. In the above bulletin Mr. Higgins enters into a clear and exhaustive account of the results achieved by this initial experiment, by reference to which the Hawaiian grower may determine the way in which to market his product with most advantage.

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### NOTICE FROM THE DIVISION OF ENTOMOLOGY.

The Entomological Division of this Board wishes to inform Hawaiian readers of this magazine that it is always ready and anxious to receive, study and report upon any insects that they may find and submit. When feasible either colonies of beneficial insects will be sent, or simple, inexpensive remedies will be prescribed. No charge.

# THE HAWAIIAN FORESTER AGRICULTURIST

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VOL. IV

DECEMBER, 1907

No. 12

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One of the most important works before the economic botanist in Hawaii is the compilation of a popular treatise upon the imported and native weed plants of Hawaii. The value of such a work to the stock raiser, and to all cultivators of agricultural crops would be very great, and we hope to see the matter, ere long, taken in hand. Not only the useless and harmless weed invaders of cultivated land require to be treated in such a work, but also all poisonous and otherwise injurious plants. A botanical and a popular description of each species, accompanied by a good illustration, and also an account of the best means of eradicating it, would form a most valuable addition to local agricultural literature. Much excellent work, of this nature, has lately appeared in the agricultural periodical literature of the British Colonies and in some cases admirable colored illustrations have accompanied the descriptions of the important specimens.

Many of the exotic weed plants of the Hawaiian Islands are well known and need no introduction to the agriculturists. However, it would come within the province of such a work as the one suggested to endeavor to attract attention to the possible economic value of plants which are now merely regarded as cumberers of the ground. Of such plants the *kolu* (mimosa) deserves especial mention. As is well known the blossoms of this plant afford a most valuable perfume, and in southern France a large population is engaged in the cultivation of the plant. In Hawaii, where the mimosa grows so luxuriantly, there should be a future before the grower of this plant for perfumery purposes, if the difficulties of the labor of gathering the blossoms could be successfully met. Probably a solution of the difficulty could be by the employment of children. No more healthful and picturesque an industry could be established near Honolulu than that of the cultivation of mimosa for perfumery purposes.

Among plants offering similar obstruction to the agriculturist are the guava and the lantana, the methods of eradication of which are similar to those required in the case of mimosa. In the case of the lantana the possibilities of discovering an economic use are slight, although it has been suggested that tannin may be extracted from it, and we have also seen it reported that its blossoms afford a perfumery useful for soap. The guava, how-

ever, offers greater promise, and the systematic cultivation of this fruit both for the manufacture of preserves, and also for the development of a dessert fruit, are worthy of trial.

The prickly-pear in these islands has not generally proved a very bad pest, although the experience of other countries has not been so fortunate. In Europe and northern Africa several delicious edible varieties of prickly-pear are grown, and would without doubt succeed well in Hawaii.

One of the most objectionable weeds near Honolulu is that appropriately designated the "stink-vine" (*mailepilau*). This unwelcome intruder has taken almost complete possession of some spots favorable to its growth, where it fills the air with its unpleasant odor and is effectually choking out both native and introduced plants. The sight of a graceful pandanus struggling beneath masses of this repulsive vine is one of the most regrettable of the silent tragedies of plant life. It is to be hoped that some way will soon be found to exterminate this undesirable weed.

There are also in the Hawaiian Islands many obnoxious introduced plants of less notoriety than those named, but whose control is none the less desirable. In many cases if the danger of allowing such weeds to spread were made known by the publication of suitable information, the pest could be often controlled and prevented from being spread wide cast through the islands. Among such useless, and often actively harmful plants, may be included several persistent grasses and other smaller weeds, which unless kept in check are likely to prove a menace to pastures and cultivated land. Many such useless weeds infest the house lot and are even ready to take possession of lawns and flower beds whenever, through lack of knowledge or other reason, they are not continually checked.

The unwelcome species are not confined to introduced offenders, but some native plants should be placed under the ban or at least looked upon with suspicion. Many a plant which in its native habitat finds a proper place in the economy of the flora, may possess inherent qualities, which when allowed to develop under artificial surroundings may develop extraordinary powers of inflicting harm upon cultivated crops. In this respect it is perhaps well to call attention to a native plant which has till now remained unheeded, except by the few who have assisted its spread from an appreciation of its fancied ornamental appearance. We refer to the *kaunaoa*, an aerial vine made use of by the natives for yellow leis. The propensity of this creeper to grow on many hosts has assisted its distribution and colonies of it are often established by the natives in convenient localities. The *kaunaoa* is evidently closely related to the European pest "Dodder" which has played havoc with many cultivated crops in Germany and England. The latter plant is a true parasite, apparently a degenerate convolvulus, devoid of leaves. It has the faculty of penetrating the bark of many plants upon which it derives nour-

ishment by suctorial rootlets embedded in the bark of the host. The general habit of the kaunaoa mark it as a plant which should be encouraged to spread beyond its native confines, as little as possible.

In a complete compilation of obnoxious weeds a list of those plants whose structure harbors mosquito larvae, and whose cultivation is therefore undesirable near habitations, would also find an appropriate place.

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*THE FARMERS' INSTITUTE OF THE TERRITORY OF  
HAWAII.*

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Honolulu, Hawaii, December 17, 1907.

Editor, Hawaiian Forester:

The second annual agricultural exhibit under the auspices of the Farmers' Institute of Hawaii, and in coöperation with the Hawaiian Poultry Association's third annual exhibition, will be held in the Drill Shed, Honolulu, January 8-11, 1908.

The Farmers' Institute invites the hearty coöperation of all agriculturists and amateur gardeners of the Territory to make this second exhibition the best possible representation of the varied and bountiful resources of our soils and climate.

It is the aim of the Institute to make this agricultural exhibition representative of all the Islands and as diversified as possible.

Entries covering a wide range of products of the farm, orchard and garden have been provided for, and in recognition of the best display, a first and second prize, consisting of a blue and a red ribbon, respectively, will be awarded in each class of exhibits.

To further encourage exhibits from the other Islands, the Inter-Island Steam Navigation Company has generously offered to transport, free of charge, all exhibits shipped from points touched by their steamers. Upon arrival in Honolulu, such exhibits will be cared for by the Farmers' Institute. No entrance fee will be charged.

A detailed list of exhibits will be published within a few days. Communications should be addressed to

F. G. KRAUSS,  
Secretary, Farmers' Institute, Honolulu.

**PROGRESS OF FORESTRY IN HAWAII DURING 1907.**

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**PAPER READ BEFORE THE HAWAIIAN SUGAR  
PLANTERS' ASSOCIATION.**

BY RALPH S. HOSMER,  
*Superintendent of Forestry of the Territory of Hawaii.*

(November 13, 1907.)

Members of the Hawaiian Sugar Planters' Association:

Gentlemen: Following the precedent of former years, the chairman of your Committee on Forestry has again asked me to appear before the Association with a statement of the progress of forestry in the Territory during the past year. This I am glad to do, for the Hawaiian Sugar Planters' Association is one of the forces that is always to be counted on for active coöperation and support in the furtherance of forestry in the islands.

Forest work in Hawaii naturally divides itself into that carried on by the Territorial Division of Forestry and that done by private individuals and corporations. It may be treated accordingly.

**FOREST RESERVES.**

In the activities of the Division of Forestry the creation of forest reserves continues to hold chief place. Since the last meeting of this Association, three additional forest reserves have been declared, as follows: Lualualei on Oahu, Hana on Maui, and Na Pali-Kona on Kauai. The area of government land in these reserves is, respectively, 3,743, 13,767, and 40,650 acres, or a total of 58,160 acres. Within the boundaries of the Hana Forest Reserve are also 1,058 acres of privately owned land; within the Na Pali Forest Reserve 19,890 acres are in private ownership.

Other forest reserve projects now awaiting final action are the proposed West Maui Forest Reserve, containing a total area of 44,440 acres; the proposed Makawao Forest Reserve, also on Maui, 1,796 acres; and a section of the land of Hono-luli, Oahu, which will make with the areas already set apart on that range a good sized forest reserve on the Waianae Hills. Within a short time the boundary of the proposed Kohala Mountain Forest Reserve will be located on the ground, when this project can be acted upon.

Each of the forest reserves set apart during the past year is made with the idea of protecting the forest on the water-



sheds of streams important for irrigation, power development or other use. They are all essentially "protection forests" and as such it is desirable that the forest within their boundaries be kept strictly intact. The same statement holds true of the projected reserves on Maui and on the Kohala Mountain.

### *Change in the Forest Reserve Law.*

At the last session of the Legislature, during the spring of 1907, a very important step in forest work was taken when the forest reserve law was so amended as to permit the Governor to set apart government land within the forest reserve boundaries, whether it is under lease or not. It is specifically provided that such action shall be subject to existing leases, but being set apart, at the expiration of the lease the land automatically comes into the class of land definitely reserved. The advantage of this is that it leaves no uncertainty as to what the government's policy will be in regard to given forest tracts. It also makes for permanency in the management of the various reserves.

### FOREST UTILIZATION.

During the last year and especially during the last two months much interest has been awakened in the subject of the utilization of the Hawaiian forests for Koa lumber and Ohia Lehua railroad ties. This development of what promises to be an additional industry to the Territory deserves special comment for it involves questions of forest policy of vital importance.

### *Two Classes of Forest.*

It is perhaps pertinent at this juncture to consider certain essential differences between the two main classes of forest in Hawaii. As I have pointed out in previous reports the primary importance of the Hawaiian forests lies in their value as a protective cover on the watersheds of the streams of the Territory, of which the water is needed for irrigation, power development, domestic supply and other uses. In practically all of the forest reserves on the windward side of the islands, or in districts where the reserve protects permanently running streams or springs, the forest cover should be kept intact, in order that the forest as a whole, including both the trees of the main stand and the shrubs and smaller plants of the undergrowth, may exercise to the full their function of retarding the run-off and thus helping to maintain a moderately even flow in the streams. For this reason I reported adversely, last July, on a proposition to lumber the forest on the government

land of Piihonua, Hawaii, in the Hilo Forest Reserve, on the ground that the opening up of the forest on that land would be detrimental to the favorable conditions existing on the drainage basin of one of the most valuable streams in the Territory—the Wailuku River.

### *The Commercial Forest.*

On the leeward side of the islands, however, and in districts where because of topography and other factors there is no permanently running water, a quite different condition obtains. Here the commercial value of the forest takes first place in an estimate of its worth. Especially is this true of Hawaii and particularly of the Kona District, although it also holds good of sections of Kau and Puna. It is hardly necessary to remark that in the utilization of the forests in these districts the work ought to be done with due regard to the future. Except in localities where it is obvious that the land can be used to better advantage for other purposes than growing trees, the indication is for methods of conservative lumbering, whereby the mature trees of merchantable value now on the land may be removed in such a way that the forest will be left in good producing condition, which will in time permit the harvesting of other crops. Fortunately for the Territory the owners of the large private estates are alive to the importance of handling their forest properties in accordance with the methods of practical forestry, so that there is every reason to expect that the major part of the lumbering done will be carried on in a systematic and carefully planned manner. This being the case the advent of this new industry is to be welcomed as a development of much importance to the Territory.

### TREE PLANTING ON WASTE LANDS.

Outside of the work in connection with forest reserves the energies of the Division of Forestry during the past year have been mainly directed (1) toward coöperative assistance to individuals and corporations desiring to plant trees and (2) to the introduction of exotic trees and shrubs of value to the Territory. Under its offer of assistance to private owners the Division of Forestry stands ready at all times to prepare planting plans for persons desiring to establish groves or plantations of forest trees, or who wish to do other forest work. This matter should be of peculiar interest to the members of this Association for there is hardly a sugar plantation on the islands but that has some areas of waste land that might well be devoted to the growing of trees. With the increasing scarcity of fuel that is being felt in many districts

and, with the steady rise in price of the lumber needed for various uses on the plantation, it needs no argument to show the advantage of a local supply, even though it meets only a part of the demand.

A number of the sugar plantations on each of the islands have undertaken and are carrying on tree planting work, but there are many areas of waste land that still wait to be made productive. The offer of the Division of Forestry to assist in this work, is a standing one; the members of the staff are ready at all times to undertake the work.

#### PLANT INTRODUCTION.

In the introduction of exotic plants the past year has seen marked progress. Through the exchange of Hawaiian grown seed of native and introduced plants, seed of many valuable trees new to the islands has been received. This seed is being started at the Government Nursery. In due course the trees resulting will be planted out in suitable situations where they can be carefully watched; those that are found to be of value will eventually be propagated and generally distributed. The results of this work can but be of value to the Territory.

Another item of considerable interest in this connection is the inauguration of systematic experiments with temperate zone trees—pines, spruces and firs—on the higher slopes of Mauna Kea and Haleakala. This work is done with the coöperation of the Federal Forest Service, from whose appropriation for this fiscal year an allotment of two thousand dollars has been made for this purpose.

#### RUBBER.

The rubber industry of the Territory continues to develop with every sign of promise. It is as yet too soon to regard it as fully established but everything points to the time when rubber will take its regular place as one of the important "allied industries." Perhaps the most notable event of the year in connection with rubber was the successful convention held at Nahiku in October, 1907,—“the first rubber convention ever held on American soil” as the papers had it—when was organized the Hawaiian Rubber Growers' Association, with the object of providing an organization which it is hoped will benefit the rubber industry in somewhat the same way that the Hawaiian Sugar Planters' Association has benefitted sugar.

To sum up: The past year may well be considered one of progress in forestry in Hawaii, for while the things actually accomplished may not in themselves be striking they nevertheless play an important part as units in the building up of the structure on which we are all at work, the development of the general prosperity of the Territory.

*AN IMPORTANT LEGAL OPINION.*

At the instance of the Board of Agriculture and Forestry, the Attorney General of the Territory of Hawaii, Honorable C. R. Hemenway, has recently handed down an opinion which, because of its far-reaching effects, is of the utmost importance to the Board, besides being a matter of much moment in the forest history of Hawaii.

The question at issue was whether or not the Board had the right to sell products from forest reserves and to use the realizations so received as a special fund for other forest work, it having been claimed by some that the law as it stands was unconstitutional in this section.

Based on an exhaustive statement of the various conditions entering the case, the Attorney General rules that the Board may properly dispose of forest products and use the money accruing therefrom for the purposes for which it is organized.

This matter is of fundamental importance to the Territory's forest work, and of such general interest that Attorney General Hemenway's opinion is here reproduced in full, as follows:

**EXECUTIVE BUILDING.****OFFICE OF THE ATTORNEY GENERAL.**

Honolulu, Hawaii, November 19, 1907.

**OPINION NO. 42.**

Honorable E. A. Mott-Smith,  
Secretary of Hawaii,  
Honolulu, T. H.

DEAR SIR:

In response to your verbal request for the opinion of this Department, as to whether the Board of Agriculture and Forestry has power to sell wood to be cut upon forest reserves, and other products of such forest reserves, and whether the realizations from such sales can properly be expended for the replanting of portions of such forest reserves, we would advise you as follows:

For a proper understanding of the question involved, it seems necessary to review the various statutes relating to forestry which have from time to time been in force in Hawaii.

The first legislature enactment on the subject of forestry was "An Act for the Protection and Preservation of Woods and Forests," Ch. 30 S. L. 1876, (Appendix, R. L. P. 1281).

This act, by Section 1, authorized the Minister of the Interior

"to set apart and cause to be protected from damage such woods and forest lands, the property of the government, as may in his opinion be best suited for the protection of water sources, and the supply of timber and fruit trees, cabinet woods and valuable shrubbery." He was also authorized, by Section 3, "to secure from the Commissioners of Crown Lands, by lease or otherwise, such woods and lands being the property of the Crown, as may be suitable for carrying out the purposes set forth in this Act." The same officer was further given authority, by Section 2, to appoint a superintendent of woods and forests whose duty it was to carry out such rules and regulations as might be established for the protection of "Reserved woods and forest lands." While the power to make such rules and regulations is not expressly given, it is one which is necessarily implied from the provisions quoted. Under this act of the legislature, therefore, certain portions of the public domain might be set apart for special purposes and became then a separate class of land to be utilized in one way only.

By the "Act to Establish a Bureau of Agriculture and Forestry," Ch. 81, S. L. 1892 (Appendix R. L. P. 1285) the execution of the law above referred to was made one of the duties of such Bureau, which consisted of the Minister of the Interior, as President ex-officio, and four other persons appointed by him with the approval of the Cabinet. Whether the Bureau thereby became authorized to set apart government lands for forest reservation is doubtful, but such Bureau clearly was charged with the duty of caring for such reservations when made. The Minister of the Interior having the care and control of government lands, being given express authority to set them apart for forest reservations, and being ex-officio President of the Bureau of Agriculture and Forestry, it may be argued that the legislature saw no need of expressly transferring the power to make such reservations inasmuch as no conflict of authority was likely to occur.

Section 9 of said Land Act "to make, alter and revoke rules and regulations \* \* \* for the protection of forests and reservations for forest growth."

The Land Act did not expressly repeal or amend the provisions of the "Act to Establish a Bureau of Agriculture and Forestry," Ch. 81, S. L. 1892 (Appendix, R. L. P. 1285), referred to above. On the contrary it must be studied in the light of such act, and construed, if possible so as not to conflict with the provisions of such. The question arises, therefore, as to what effect the Land Act had on the previous provisions of law.

It will be noted that forest reservations heretofore made remained under the control of the Minister of the Interior, who also was to take charge of all reservations of public lands thereafter made for "public purposes." It will also be noted that the Commissioners of Public Lands were placed in charge of all public lands, except certain designated classes, and that when lands were set apart by them "for public purposes" such lands thereupon

passed under the control of the Minister of the Interior. Express power to make forest reservations was not given the Commissioners, and this power, if given, must be implied from the provisions of Section 2 that "all land hereafter reserved by the Commissioners for public purposes, shall thereupon at once pass under the control and management of the Minister of the Interior" and from the power given in Section 9 to make rules and regulations respecting "forests and reservations for forest growth." It might, therefore, seem that the power theretofore existing in the Minister of the Interior to set apart forest reservations was by the Land Act transferred to and lodged in the Commissioners of Public Lands, and that such reservations when made by such act immediately passed out of the control of said Commissioners and into the control of said Minister, or therefore into the control of the Bureau of Agriculture and Forestry of which said Minister was ex-officio President. But it must not be forgotten that the Minister was by law one of the Commissioners of Public Lands so that again it may be reasonably concluded that the Legislature anticipated no conflict of authority and therefore felt that there was no need to more clearly define the limits of the powers to be exercised by the Minister of the Interior on the one hand and the Commissioner of Public Lands on the other.

It must also be borne in mind that the purpose of the Land Act differs widely from that of the Forestry Laws. The former was designed chiefly with the object in view of settling the land and causing it to produce immediate money revenue, while the latter was intended to conserve the water and timber supply for the purpose not of immediate gain, but of future and continuous benefit to the entire country.

That the general policy of making such reservations was approved and intended to be continued in force is shown by the fact that the existing law as to forestry was not specifically amended or repealed by the Land Act.

Such being the case, and in order to give effect to both provisions of law, which should be construed, if possible, so that each may stand, it may be fairly held that the power of the Minister and Bureau to make forest reservations was continued and that the Commissioners were intended to have authority to make rules and regulations only as to forest lands not formally "reserved," while the Bureau retained authority to make such rules for actual forest reservations under its control. By such a construction the spirit and intent of all legislation on the subject would be conserved.

It therefore, would appear that the true intent of the various acts under consideration was that such lands should be set apart for a forest reservation as the Minister of the Interior, under the direction of the Bureau, should consider necessary for such purpose, and that such land should thereupon pass to the exclusive control of such Minister subject as to management to the advice

and supervisory care of the Bureau of Agriculture and Forestry.

If such is the proper construction of these enactments, then at the time the Organic Act went into effect, the Minister of the Interior still possessed the power to effect a reservation of portion of the public domain for forestry purposes, which when so set apart passed into the control of the Bureau of Agriculture and Forestry.

By Section 73 of the Organic Act the land laws of Hawaii were continued in force until Congress should otherwise provide, the only change being that one officer performs the duties and exercises the powers formerly performed and exercised by the Commissioners. By Section 74 of said Organic Act the laws relating to Agriculture and Forestry also remained the same, but subject to modification both by Congress and the local legislature. By Section 75 of said Act the Superintendent of Public Works was given the powers and duties of the former Minister of the Interior with regard, among other things, to "other grounds and lands now under the control and management of the Minister of the Interior," and subject to change by the Legislature of Hawaii.

Just what the "land laws" of Hawaii were, as the term is used by Congress, is not altogether clear. Beyond question the Commissioner of Public Lands has the power and is charged with the duties of the former Commissioners of Public Lands, one of whom was the Minister of the Interior. It is also clear that the Superintendent of Public Works was given the custody and control of lands set apart for various public purposes and formerly in charge of the Minister of the Interior. A distinction clearly exists as to the general powers and duties of these officers in that the Congress alone may modify those of the Commissioner of Public Lands, while both Congress and the local legislature may change those of the Superintendent of Public Works. But has the Commissioner of Public Lands the sole or any authority to set apart and reserve portions of the public domain for forestry purposes or is that power one which Congress intended to and did leave to some other officer?

If the Commissioner has such authority then Chapter 14, S. L. 1903 (Ch. 28 R. L.), creating the Board of Agriculture and Forestry is valueless to the extent that it attempts to authorize the Governor to make such reservations; if, however, some other officer had such authority, then the provisions of said Chapter are valid. If the reasoning above is sound, and the Commissioner has no such power under the "Land Act," then his power, if any, must be found in the Organic Act.

From the fact that the laws relating to agriculture and forestry were continued in force until modified with the single change that a single commissioner should perform the duties formally required of the Bureau, it would appear that Congress realized the necessity of making the care and protection of forest reservations the special duty of some officer, or set of officers, and approved of

the existing system. If so, then Congress certainly intended to provide for the creation of forest reservations by the act of some authorized officer. Section 1 of Chapter 30, S. L. 1876, which authorized the Minister of the Interior or the Bureau of Agriculture and Forestry to make such reservations was still a part of the statute law, but the office of Minister of the Interior ceased, and the powers exercised by him were divided among several officers, to-wit. the attorney general, treasurer, superintendent of public works, and commissioner of public lands, but an examination of the provisions of the Organic Act as to the powers and duties of these officers shows that no one of them succeeded to this particular power, and it is necessary to look farther or to conclude that Congress failed of its purpose.

By Section 68 of the Organic Act, the Governor was given "all the powers and duties, which by the law of Hawaii, are conferred upon or required of \* \* \* any minister of the Republic of Hawaii (acting alone or in connection with any other officer or person or body) \* \* \* and not inconsistent with the Constitution and laws of the United States." Under this provision it may be fairly considered that the power to create forest reservations was transferred by Congress to the Governor. By such holding full effect is given to the intent of Congress in continuing in force the local laws relating to agriculture and forestry and the full purpose of such laws could be carried out. It is our opinion then, that after the passage of the Organic Act the Governor had power to withdraw lands from the control of the Land Commissioner for forestry purposes, and that such lands so reserved then passed under the control of the Bureau of Agriculture and Forestry. This power is not inconsistent with the powers of the Commissioner of Public Lands, but is entirely separate and distinct therefrom. The Commissioner was not given nor intended to have all powers relative to the use and control of all public lands, but only those formerly exercised by the Commissioners of Public Lands, and the Land Act as pointed out above gave certain distinct powers exercised by the former Minister of the Interior, to the Superintendent of Public Works.

This was the status of the law until the passage of Chapter 44, S. L. 1903 (Ch. 28 R. L.), creating the Board of Agriculture and Forestry, which is the statute under which forest reservations are now handled. It is clear that the Legislature was given power by Section 74 of the Organic Act to enact this statute. The question, therefore, comes down to a construction of this statute and it must be determined whether by it the Board has authority to manage and control all forest reservations with power to sell their produce or whether any of such powers have been transferred to the Commissioner of Public Lands.

By Section 397 R. L., the power to set aside lands as forest reservations is continued in the Governor and made subject to the approval of the Board, a public hearing being first had.



Under subdivision 6 of Section 377, R. L., and Section 379, R. L., government lands, when set apart for forest reserves are declared to be under the care, custody and control of the Board of Agriculture and Forestry, the executive officer of which also has all powers and duties vested before April 25, 1903, in the Commissioner of Agriculture and Forestry. (Sec. 373 R. L. as amended by Act 106, S. L. 1907.)

Subdivisions 7 and 8 of Section 377, R. L., which section defines the duty of the Board, read as follows:

**"7 PROTECTION OF FORESTS AND WATER SUPPLY.** To devise ways and means of protecting, extending, increasing, and utilizing the forests and forest reserves, more particularly for protecting and developing the springs, streams and sources of water supply, so as to increase and make such water supply available for use;

**"8. SELF-SUPPORT OF FORESTS.** To devise and carry into operation, ways and means by which forests and forest reservations can, with due regard to the main objects in this chapter set forth, be made self-supporting in whole or in part"

The duty to protect, extend, increase and utilize forests and forest reserves, and to devise and carry into operation ways and means by which forests and forest reserves can be made self-supporting, carries with it such power as is necessary to properly perform such duty. If in the due performance of the duty thus laid on the Board of Agriculture and Forestry it becomes necessary for the Board to cut and remove a portion of the timber in the forest reserve, the Board would have power to do so; and in order to carry out the duty of devising ways and means of making forests and forest reserves self-supporting, the Board would have power to sell timber so cut. The exercise in any case of a power by the Board must be limited by the necessity for its use in order to perform properly a duty laid upon it, and only the power necessary to perform such duty is given it. While the power of the Board to cut and remove wood upon forest reserves is an implied power only, yet the provisions of Section 385 of the Revised Laws seem to indicate that the legislature intended to authorize the Board to exercise just such power whenever it was necessary for the protection, increase, or extension of forests and forest reserves. That section reads as follows:

**"Sec. 385. INCOME FROM FOREST RESERVES.** In case any money shall accrue from any forest reserve, or the products thereof, the same shall be deposited in the treasury as a special fund for the preservation, extension and utilization of forests and available for use under this chapter, subject to withdrawal and use in the same manner as moneys appropriated by the legislature."

By this section it seems clear that the purpose of the legislature was to permit the expenditure of moneys realized from the products of the forests, such as timber, for the purpose of general improvement of the forest lands set apart as reservations, and unless the legislature contemplated that moneys would be realized by such sales, the presence of this section in the law would be valueless.

The conclusion drawn is that the reservation of forest lands may properly be done by the Governor; that when so done the lands come under the control of the Board of Agriculture and Forestry, passing out of the hands of the Commissioner of Public Lands, that said Board is empowered to dispose of such products of the forests as are necessarily taken therefrom to carry out the purposes of this act and to enable a proper performance of the general duty to protect, extend, increase and utilize the forest with a view to rendering the same self-supporting in whole or in part; and that the proceeds of a sale of such products may be deposited in the Treasury as a special fund and used by the Board for the purposes set out in Section 385 R. L.

Very truly yours,

(Signed) C. R. HEMENWAY,  
Attorney General.

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### NEW PUBLICATIONS.

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#### FARMERS' BULLETIN NO. 307.

Roselle: Its Culture and Uses. By P. J. Wester, Special Agent.  
Pp. 16, figs. 6.

History, geographical distribution, botanical characteristics, varieties, cultivation, uses, etc., of the roselle plant, with a statement of its composition, its fungous diseases and insect enemies.

#### FARMERS' BULLETIN NO. 309.

Experiment Station Work, XLIII, Compiled from the Publications of the Agricultural Experiment Stations. Pp. 32.

Contents: Ice for household—Culture and varieties of root crops—Cowpeas and soy beans—Silage from frosted corn—Cooperation in marketing crops—Incubation of eggs—Causes of death of young chicks—Snow for poultry—Eradication of cattle ticks—Bacteria in cream.

# BOARD OF AGRICULTURE AND FORESTRY.

## Division of Forestry.

### ROUTINE REPORTS.

Board of Commissioners of  
Agriculture and Forestry,  
Honolulu.

November 20, 1907.

Gentlemen:

I have the honor to submit the following report for the period from October 30th, 1907, to date:

My own time during this period has been mainly occupied in the preparation of reports on several matters referred to me by the Committee on Forestry and in the regular routine work of the Division of Forestry.

On November 13th, at the request of the Secretary and the Chairman of the Committee on Forestry of that organization, I read a paper on "the progress of forestry in Hawaii during the past year," before the Hawaiian Sugar Planters' Association. At the same meeting, Mr. L. A. Thurston, the Chairman of the Committee on Forestry, presented an exceedingly able statement that set forth in a comprehensive way how the diminishing timber supply on the American mainland directly affects the forest question in Hawaii and how, consequently, it is essential to the continued well being of these islands that a rational forest policy be adhered to. Mr. Thurston's address was published in full in the Advertiser of November 15th, 1907. It will repay careful reading and thoughtful consideration.

By proclamation of Governor Frear, Arbor Day was this year observed on Friday, November 15. As usual the celebration of the day was principally by the schools. In Mr. Haughs' report will be found a statement of the number of trees sent out from the Government Nursery for Arbor Day planting.

Since October 30 the library room of the Board has been used for evening meetings, as follows:

Honolulu Improvement Advisory Board, November 5.

Hawaiian Poultry Association, November 12.

" " " " 18.

Very respectfully,

RALPH S. HOSMER,  
Superintendent of Forestry.

*Notes from the report of the Forest Nurseryman.*

## ARBOR DAY.

The plants sent out for Arbor Day planting, with number of schools by islands, is as follows:

Islands.	Schools.	Plants.
Oahu .....	10	133
Hawaii .....	7	280
Kauai .....	2	42
Maui .....	5	180
Molokai .....	4	889
	<hr/> 28	<hr/> 1524

## NURSERY.

Three thousand seeds of Para rubber (*Hevea brasiliensis*) are being propagated at the request of Commissioner Giffard. The seed was received in first class condition and is sprouting splendidly.

The five thousand seeds belonging to the Castle Estate are also growing vigorously and will require to be taken to their destination and transplanted in the course of a week or two.

The work of improving the Nursery grounds is still progressing. The trees are being pruned with the object of making them more symmetrical and allowing more light to the grass.

## COLLECTING AND DISTRIBUTION OF SEEDS.

Two packages of seed of the Grass tree (*Xanthorrhoea hastilis*) were received from Mrs. Hans Isenberg, Lihue, Kauai.

By exchange:

6 packages from Imperial Biological Institute, Amani, Port Tonga, German East Africa.

6 packages from Acclimatization Society Gardens, Brisbane, Queensland.

26 packages from Harvard Experiment Station, Soledad, Cienfuegos, Cuba.

The collecting of island grown seed has been continued; a large variety is always kept in stock.

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*THE RUBBER CONVENTION.*

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By an inadvertence, in the report of the Rubber Convention at Nahiku, Maui, which appeared in the October number of the Forester, the speech of Governor Frear was attributed to Mr. Lindsay. We apologize to all concerned for this transposition of names.

*OUR NATURAL RESOURCES.*

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In a circular letter addressed by President Roosevelt to the Governors of the States, the importance of conserving for future generations the natural resources of the nation are urged at some length. The subject is one which no thoughtful man can view with unconcern, and is so important that we print the letter al-luded to, verbatim:

The White House,  
Washington, November 11, 1907.

My Dear Governor: The natural resources of the territory of the United States were, at the time of settlement, richer, more varied, and more available than those of any other equal area on the surface of the earth. The development of these resources has given us, for more than a century, a rate of increase in population and wealth undreamed of by the men who founded our government and without parallel in history. It is obvious that the prosperity which we now enjoy rests directly upon these resources. It is equally obvious that the vigor and success which we desire and foresee for this nation in the future must have this as its ultimate material basis.

In view of these evident facts it seems to me time for the country to take account of its natural resources, and to inquire how long they are likely to last. We are prosperous now; we should not forget that it will be just as important to our descendants to be prosperous in their time as it is to us to be prosperous in our time.

Recently I expressed opinion that there is no other question now before the nation of equal gravity with the question of the conservation of our natural resources; and I added that it is the plain duty of those of us who, for the moment, are responsible, to make inventory of the natural resources which have been handed down to us, to forecast, as well as we may, the needs of the future, and so to handle the great resources of our prosperity as not to destroy in advance all hope of the prosperity of our descendants.

It is evident that the abundant natural resources on which the welfare of this nation rests are becoming depleted and in not a few cases are already exhausted. This is true of all portions of the United States; it is especially true of the longer settled communities of the East. The gravity of the situation must, I believe, appeal with special force to the Governors of the States because of their close relations to the people and their responsibility for the welfare of their communities. I have therefore decided, in accordance with the suggestion of the Inland Waterways Commission, to ask the Governors of the States and Territories to meet at the White House on May 13, 14, and 15, to confer with the President and with each other upon the conservation of natural resources.

It gives me great pleasure to invite you to take part in this conference. I should be glad to have you select three citizens to accompany you and to attend the conference as your assistants or advisors. I shall also invite the Senators and Representatives of the Sixtieth Congress to be present at the sessions so far as their duties will permit.

The matters to be considered at this conference are not confined to any region or group of States, but are of vital concern to the Nation as a whole and to all the people. These subjects include the use and conservation of the Mineral Resources, Resources of the Land, and the Resources of the Waters, in every part of our territory.

In order to open discussion I shall invite a few recognized authorities to present brief descriptions of actual facts and conditions, without argument, leaving the conference to deal with each topic as it may elect. The

members of the Inland Waterways Commission will be present in order to share with me the benefit of information and suggestion, and, if desired, to set forth their provisional plans and conclusions.

Facts, which I can not gainsay, force me to believe that the conservation of our natural resources is the most weighty question now before the people of the United States. If this is so, the proposed conference, which is the first of its kind, will be among the most important gatherings in our history in its effect upon the welfare of all the people.

I earnestly hope, my dear Governor, that you will find it possible to be present.

Sincerely yours,

(Signed.) THEODORE ROOSEVELT.

Hon. Walter F. Frear,  
Governor of Hawaii,  
Honolulu, Hawaii.

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## ARBOR DAY.

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### PROCLAMATION OF THE PRESIDENT TO THE SCHOOL CHILDREN OF THE UNITED STATES.

To the School Children of the United States:

Arbor Day (which means simply "Tree Day") is now observed in every State in our Union—and mainly in the schools. At various times from January to December, but chiefly in this month of April, you give a day or part of a day to special exercises and perhaps to actual tree planting, in recognition of the importance of trees to us as a nation, and of what they yield in adornment, comfort, and useful products to the communities in which you live.

It is well that you should celebrate you Arbor Day thoughtfully, for within your lifetime the Nation's need of trees will become serious. We of an older generation can get along with what we have, though with growing hardship; but in your full manhood and womanhood you will want what nature so bountifully supplied and man so thoughtlessly destroyed; and because of that want you will reproach us, not for what we have used, but for what we have wasted.

For the nation as for the man or woman and the boy or girl, the road to success is the right use of what we have and the improvement of present opportunity. If you neglect to prepare yourselves now for the duties and responsibilities which will fall upon you later, if you do not learn the things which you will need to know when your school days are over, you will suffer the consequences. So any nation which in its youth lives only for the day, reaps without sowing, and consumes without husbanding must expect the penalty of the prodigal, whose labor could with difficulty find him the bare means of life.

A people without children would face a hopeless future; a country without trees is almost as hopeless; forests which are so used that they can not renew themselves will soon vanish, and with them all their benefits. A true forest is not merely a storehouse full of wood, but, as it were, a factory of wood, and at the same time a reservoir of water. When you help to preserve our forests or to plant new ones you are acting the part of good citizens. The value of forestry deserves, therefore, to be taught in the schools, which aim to make good citizens of you. If your Arbor Day exercises help you to realize what benefits each one of you receives from the forests, and how by your assistance these benefits may continue, they will serve a good end.

THEODORE ROOSEVELT.

The White House, April 15, 1907.

## THE DISAPPEARING WHITE PINE.

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The position which the United States has held as a lumber-producing nation has, perhaps, been due more to white pine than to any other wood. The timber of this valuable tree which has played a most important part in the material development of the nation is fast disappearing and now it is as costly as the finest American hardwoods.

Rev. Edward Everett Hale, the chaplain of the Senate, who has always taken an interest in forestry, deplors the passing of white pine as our foremost wood, and tells how in his own lifetime he has seen the day when "the masts of every vessel that sailed the Seven Seas were made from New England grown pine; while today very little white pine is cut in New England big enough to furnish a good-sized spar." He tells also, to illustrate the increasing cost of the wood, that he ordered a set of book shelves on which the cabinet-maker made a price, and then asked whether they should be of mahogany or white pine.

The white pine production has shifted from New England to the Lake States, and Michigan was the leading lumber-producing State for twenty years, from 1870 to 1890, with a supremacy based on white pine. In these two decades the cut was 160 billions of board feet, valued, at the point of production, at not less than two billion of dollars, or nearly half as much as the value derived from all the gold fields of California from their discovery in the late forties until the present. The rich forests of Michigan were once thought inexhaustible and lumbering continued in a most reckless manner for years. Suddenly the people awoke to the fact that the thoughtless destruction of the trees had thrown 6,000,000 of acres on the delinquent tax list. These white pine barrens point to the terrible penalty of wasting the forest resources which should have been the heritage of all future generations.

An idea of the increasing scarcity of white pine timber is given by the New York F. O. B. quotations, on a basis of carload lots. "Uppers" of the best grade, cost \$97 to \$114 a thousand board feet, and the "selects" or next lower grade cost \$79.50 to \$99.50. Men who are not yet middle-aged remember the time when these grades could be purchased at \$15 to \$25 a thousand feet. The present quotations on quartered white oak, which are \$75 to \$80, offer another basis of comparison which indicates the condition of the market for white pine.

The best stands of this timber now in this country are in scattered sections in Minnesota, New England, and parts of Idaho. The species in Idaho is sometimes called silver pine. Some of the country's best white pine is found on the Indian reservations in Minnesota and Wisconsin, and scattered stands are found in the States of Wyoming, Montana, Colorado, and one or two other States. At the present rate of cutting the tree will soon be practically a thing of the past. The small stands in the National forests are inconsiderable, but they will be managed with the greatest conservatism by the Government through the Forest Service, and through this method and practice of reforestation it may be hoped that the fine old tree will furnish timber for other generations.

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## ANOTHER NEW INDUSTRY.

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The installation of two modern lime kilns at Iwilei by the Waianae Lime Company, affords another noteworthy example in the movement which has been taking place in Hawaii during the the last few years of making the islands independent of the out-

side world for the supply of many important commodities. The annual importations of lime are valued at about an eighth of a million dollars, and if the quality of the new company's product continues to be equal to that of its first samples, there is little doubt that the local firm will be called upon to supply most of the Hawaiian market.

The new kilns at Iwilei are thoroughly modern, and although they bear little resemblance to the old type of apparatus, the process involved in the manufacture of lime is identical with that carried on for countless ages. Each kiln consists in brief of a large vertical steel cylinder, thickly lined with fire brick and having an inside diameter of four feet six inches. The fuel used is oil, and while the calcining process is continued the lime is removed from below and fresh supplies of limestone added to the top of the kiln. The latter is constructed so as to be kept in operation day and night, thus obviating the former method of allowing time for cooling. The lime is collected upon a cement floor, where after cooling, it is packed into barrels and is then ready for shipment. The kilns have an estimated capacity of one hundred tons each per day of twenty-four hours.

The limestone used is quarried at Waianae, from whence it is brought by rail direct to the kilns. The company has also established a cooper shop where it is constructing its own barrels.

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## *THE COLLEGE OF AGRICULTURE AND MECHANIC ARTS.*

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### APPOINTMENT OF ACTING DEAN.

Mr. Willis T. Pope, of the science department of the Honolulu Normal School, has been appointed Acting Dean of the College of Agriculture and Mechanic Arts of the Territory, in the place of the late Mr. J. E. Roadhouse, whose decease was recently announced. The organization of the new institution will be proceeded with immediately on the new High School site near Thomas Square. As soon as the development of the College permits, it will remove to its permanent quarters in Manoa Valley, adjoining the Mid-Pacific Institute, where a tract of over thirty acres of excellent land is reserved for it.

The task of establishing a College of Agriculture and Mechanic Arts in its numerous departments will be no light one. In the selection of Mr. Pope for this work, however, the Regents have acquired one who, besides the ordinary requisites of education and experience, has knowledge of tropical and local agriculture, and possesses the confidence of the community.



Mr. Pope was born in Decatur, Illinois, in 1873. He is a graduate of Kansas Agricultural College, where he specialized in dairy work and in horticulture. During his collegiate course he was also an assistant at the United States Agricultural Station at Manhattan. After holding important agricultural positions in which he acquired valuable knowledge in the practical cultivation and marketing of fruit, he was appointed to the chair of Horticulture at the National Farm School at Doylestown, near Philadelphia, in 1900. In 1902 Mr. Pope accepted the appointment at the Honolulu Normal School, which he is now relinquishing.

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### NOTES.

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#### COCOA.

Cocoa importations to the United States now average over a million dollars a month in value, against an average of a quarter of that amount a decade ago. The practicability of growing cocoa commercially in Hawaii has not been proved, but it is one of the most promising agricultural experiments which require to be demonstrated. The cultivation of cocoa is a very remunerative asset to many countries similarly situated as Hawaii and is one which in every way is worthy of establishing in the islands.

#### STRIPPING OF CANE.

The custom of stripping cane which has been extensively followed for many years is one of questioned value. Mr. H. P. Baldwin recently recommended that the Experiment Station of the Hawaiian Sugar Planters' Association conduct an exhaustive series of experiments in order to exactly determine the effect of stripping. He believes that stripping on all plantations was a mistake and was attended by loss of sugar content. It is extraordinary that such a subject as this should still be unsettled, but many plantations still continue to spend large sums annually in stripping cane, while the opponents of the method condemn it as being not only expensive, but as depleting the cane of its sugar.

#### STOCK PESTS.

At a recent meeting of the Hawaiian Live Stock Breeders' Association, Mr. D. L. Van Dine read a preliminary report upon the insects affecting the cattle industry in the islands. The horn fly was mentioned as one of the worst enemies of stock in the Terri-

tory. This pest was introduced only ten years ago, but it has multiplied at an astonishing rate during this interval. There is every reason to believe that this fly will soon be controlled by its natural enemies. The bot fly was also mentioned in connection with cattle, although it has not developed its full destructive habits in this country.

Of the pests affecting sheep, the blow fly has proved very injurious, especially on Molokai, Hawaii and Oahu. In one year it had caused the death of 5,000 out of 18,000 sheep.

Among the insect pests of horses were the stable fly, the horse bot fly and the mosquitoes. The latter insect worries the animals and causes more injury than is generally appreciated.

#### BREAD FOR HORSE FEED.

The practice of feeding horses on bread was once very general and it still obtains in many parts of Europe. In Switzerland the bread for this purpose is made into long loaves from third-class rye flour and baked as hard as a brick. One pound of bread is given in the morning and a feed of bread at intervals when halting. Hay and oats are given as well. Animals fed in this manner are said to keep in excellent condition.

#### SEA-WEED MANURE.

In many countries the use of sea-weed for manure is well known. Where it occurs in sufficient quantities it may be removed from reach of the waves and allowed to rot out during the rainy season, when it will become depleted of its salt and ready for use on the soil.

#### COCONUTS FOR KAILUA.

One thousand coconut palms were received recently from Kauai on the W. G. Hall by The Waterhouse Company. They will be taken to Kailua, on the other side of the island, and set out on the new copra plantation.

#### INDEX FOR 1907.

An index for Volume IV of The Forester is in preparation and will be ready to accompany the January number.

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# Board of Agriculture and Forestry.

## FOREST AND ORNAMENTAL TREE SEED AND SEEDLINGS FOR SALE AT THE GOVERNMENT NURSERY.

The Division of Forestry keeps constantly on hand at the Government Nursery, seed and seedlings of the important native and introduced trees. These are sold at prices just covering the cost of collection or growing.

The list includes both forest and ornamental trees, such as Silk Oak, Koa, various species of Eucalyptus, Golden and Pink Showers, Pride of India, Poinciana, Albizzia, etc. The price of the seed varies from 10 to 50 cents per ounce. The seedlings may be had for 2½ cents each, except a few kinds which are 5 cents. Seed of the various palms is also for sale; the price per 100 varying from \$1.00 to \$2.50. All seed is tested before being sent out, which insures its being good.

All communications in regard to seed or trees should be addressed to David Haugh, Forest Nurseryman, Box 331, Honolulu, Hawaii.

RALPH S. HOSMER,  
Superintendent of Forestry.

## PUBLICATIONS FOR DISTRIBUTION.

### BOARD.

Report of the Commissioner of Agriculture and Forestry for 1900; 66 pp.

Report of the Commissioner of Agriculture and Forestry for 1902; 88 pp.

\* First Report of the Board of Commissioners of Agriculture and Forestry, from July 1, 1903, to December 31, 1904; 170 pp.

Second Report of the Board of Commissioners of Agriculture and Forestry, for the year ending December 31, 1905; 240 pp.; 8 plates; 10 text figures.

Third Report of the Board of Commissioners of Agriculture and Forestry, for the year ending December 31, 1906; 212 pp.; 3 plates; 4 maps; 7 text figures.

"Notice to Importers," by H. E. Cooper; 4 p.; 1903.

"Digest of the Statutes Relating to Importation, Soils, Plants, Fruits, Vegetables, etc., into the Territory of Hawaii." General Circular No. 1; 6 pp.

"Important Notice to Ship Owners, Fruit Importers and Others. Rules and Regulations Prohibiting the Introduction of Certain Pests and Animals into the Territory of Hawaii." General Circular No. 2; 3 pp.; 1904.

### DIVISION OF ENTOMOLOGY.

"The Leaf-Hopper of the Sugar-Cane," by E. C. L. Perkins. Bulletin No. 1; 38 pp.; 1903.

\* "On Some Diseases of Cane Specially Considered in Relation to the Leaf-Hopper Pest and to the Stripping of Cane," by E. C. L. Perkins. Press Bulletin No. 1; 4 pp.; 1904.

"A Circular of Information," by Jacob Kotinsky. Circular No. 1; 8 pp.; 1905.

"The Japanese Beetle Fungus," by Jacob Kotinsky and B. M. Newell. Circular No. 2; 4 pp., cut; 1905.

Report of the Division of Entomology, for the year ending December 31, 1905.

Reprint from Second Report of the Board; 68 pp.; 3 plates; 10 text figures.

Report of the Division of Entomology, for the year ending December 31, 1906.

Reprint from Third Report of the Board; 25 pp.; 7 text figures.

### DIVISION OF FORESTRY.

\* "Forest and Ornamental Tree Seed for Sale at Government Nursery." Press Bulletin No. 1; 3 pp.; 1905.

"Suggestions in regard to the Arbor Day Tree Planting Contest." Press Bulletin No. 2; 7 pp.; 1905.

"An Offer of Practical Assistance to Tree Planters." Circular No. 1; 6 pp.; 1905.

"Revised List of Forest and Ornamental Tree Seed for Sale at the Government Nursery." Press Bulletin No. 3; 4 pp.; 1906.

"Instructions for Propagating and Planting Forest Trees." Press Bulletin No. 4; 4 pp.; 1906.

Report of the Division of Forestry, for the year ending December 31, 1905. Reprint from Second Report of the Board; 77 pp.; 5 plates.

Report of the Division of Forestry, for the year ending December 31, 1906. Reprint from Third Report of the Board; 123 pp.; 4 maps.

### DIVISION OF ANIMAL INDUSTRY.

"Inspection of Imported Live Stock." Rule 1; 1 p.; 1905.

"Inspection and Testing of Imported Live Stock for Glanders and Tuberculosis." Rule 2; 1 p.; 1905.

"Concerning Glandered Horse Stock in the Territory." Rule 3; 1 p.; 1905.

Report of the Division of Animal Industry, for the year ending December 31, 1905. Reprint from Second Report of the Board; 62 pp.

Report of the Division of Animal Industry, for the year ending December 31, 1906. Reprint from Third Report of the Board; 41 pp.; 3 plates.

### DIVISION OF AGRICULTURE.

Report of the Division of Agriculture, for the year ending December 31, 1905.

Reprint from Second Report of the Board; 12 pp.

Report of the Division of Agriculture, for the year ending December 31, 1906.

Reprint from Third Report of the Board; 6 pp.

\* Out of Print.

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